Gas Journal

VOL. 291. 109th YEAR. LONDON, SEPTEMBER 4, 1957 No. 4912 PRICE 1/6

advertising keeps
ASCOT
on the up and up

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DETROIT

10,000,000 people
will see ASCOT advertising this year

REGD. TRADE MARK
ASCOT

Ascot Gas Water Heaters Ltd.
255 N. Circular Road, London, N.W.10

a member of the Parnall Group of Companies

WHG/A288

BUCKLERSBURY HOUSE TO STAND ON 3,500 BORED PILES

This important Office Building in the City of London, 17 storeys high including the basement floors, is supported on Cementation Bored Piles. Approximately 3,500 were constructed well within the contract time despite the fact that delays were unavoidably occasioned by the deliberations on the fate of the Mithras Temple discovered on the site and other major difficulties inevitable on such a large site.

The construction of a surrounding wall to retain the adjoining Queen Victoria Street, Cannon Street and Bucklersbury was greatly facilitated by the use of our bored piles.

The close proximity of important buildings including the Mansion House and services such as the Underground Railway made it necessary to reduce noise, vibration, etc., to an absolute minimum.

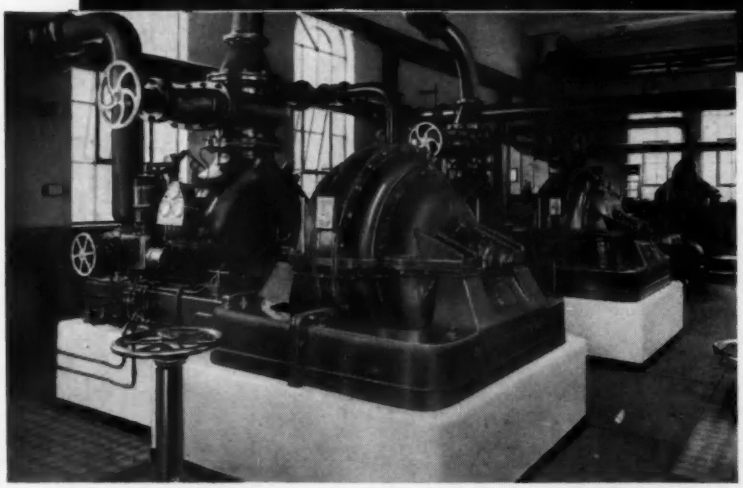
The CEMENTATION COMPANY LIMITED

Head Office: 20 Albert Embankment, London, S.E.11. Telephone: RELiance 7654

Mining Dept : BENTLEY WORKS, DONCASTER. **Tel. : 54175 and 54136**

'C.M.' TYPE TURBO BOOSTERS

for medium volumes and higher pressures



- **LARGER CAPACITIES IN SMALLER SPACES**
- **HIGHER EFFICIENCIES**
- **IMPROVED MECHANICAL DESIGN**

'CM' 62 Two Stage Turbo Boosters each to pass 500,000 cubic feet per hour at 5 lbs per square inch (Gas—specific gravity = .55) Driven by 260 b.h.p. Brotherhood Turbines running at 7,000 r.p.m.

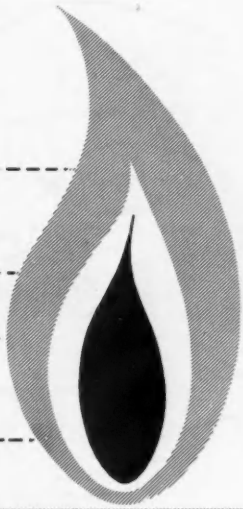
Photograph by courtesy of South Eastern Gas Board

Installed at Waddon Works, Croydon, for the supply of gas to:— Redhill, Horley, and Crawley New Town.

THE BRYAN DONKIN CO. LTD.

DERBY ROAD · CHESTERFIELD

INDUSTRIAL AND DOMESTIC THERMOSTATS
REMOTE CONTROL VALVES
SMALL GAS FITTINGS
FLAME FAILURE EQUIPMENT
MAIN COCKS



GAS CONTROL

Spersom TRADE MARK

SPERRYN & CO. LTD.

MOORSOM STREET, BIRMINGHAM 6. Phone: Aston Cross 4011 (5 lines)
LONDON ADDRESS: 23 GT. SUFFOLK ST. LONDON S.E.1. Phone: Waterloo 6418

PRODUCT OF Radiation Ltd

GEORGE GLOVER & CO. LTD.

GAS METERS

maintain their lead
in Design and Quality

GEORGE GLOVER & CO. LTD., RANELAGH WORKS, 122 KINGS ROAD, CHELSEA, LONDON, S.W.3.

SERVE IT REALLY *Hot*

with a **Snackmaster**

AND HOT CUPBOARD

Specially designed to provide a combined plate storage and service unit at a reasonable price.

MODEL 4

This Snackmaster has a polished Birmabright Easy-Clean Hob with Four 1-Gallon Aluminium Pots and an Entree Pan with Cover, 17" x 13" x 3", inset into a water pan of heavy gauge tinned copper. The Hot Cupboard is constructed of heavy gauge steel, vitreous enamelled, with two removable aluminium shelves, and the unit is heated at base by gas burner or electric element.

MODEL 2

A unit designed for the storage of soup, etc., ready for service and fitted with four 1-gallon aluminium pots, inset into a water pan of heavy gauge tinned copper. Unit measures 20" x 20" x 13½" high. Hot cupboard with single door can be fitted under.

Please send full particulars of the above item together with the address of our nearest supplier

Please 'tick' below other items of catering equipment of which you would like full particulars.

- COFFEEMASTER ☐
- BOILERS & CAFE SETS ☐
- HOT CUPBOARDS ☐
- STEAMING OVENS ☐
- SNACKMASTER GRIDDLE ☐
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- FISH FRYERS ☐

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AQUAFONT INDUSTRIES LTD

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Telephone: GULLIVER 6171 (Private Exchange)

when atmospheric pollution is severe

— specify ATLAS Rubber Paints. These are products designed specifically for the complete protection of structural iron and steel work in foundries, sugar refineries, gasworks, paper mills, galvanising and plating shops, canneries, dyehouses and other places where severe acid or alkaline fumes abound and corrosion is rife.

We will gladly give you technical advice on the best use of ATLAS Rubber Paints to meet your particular requirements.

Write to us now for colour card and price list.

ATLAS

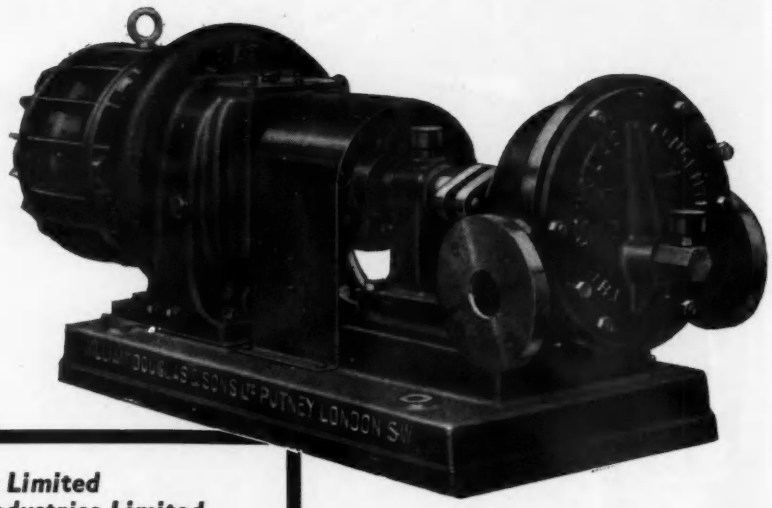
DESIGNED TO RESIST SEVERE CORROSIVE CONDITIONS

Rubber Paints

ATLAS PRESERVATIVE CO. LTD., ERITH, KENT. 'Phone: ERITH 2255 (3 lines), 5721 (4 lines) 'Grams: Deoxydizer, Erith.

TAS/AS 169

Britain's Busiest Pump



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You will find Douglas Pumps at work in most of Britain's largest concerns. Many of these pumps have been in *continuous* operation for a very long time, in some instances since the 1930's, requiring only routine maintenance. The liquors and semi solids they handle vary from acids and solvents to tallow and tar. A complete range of models is available and service and advice freely given. Please write for details.

DOUGLAS

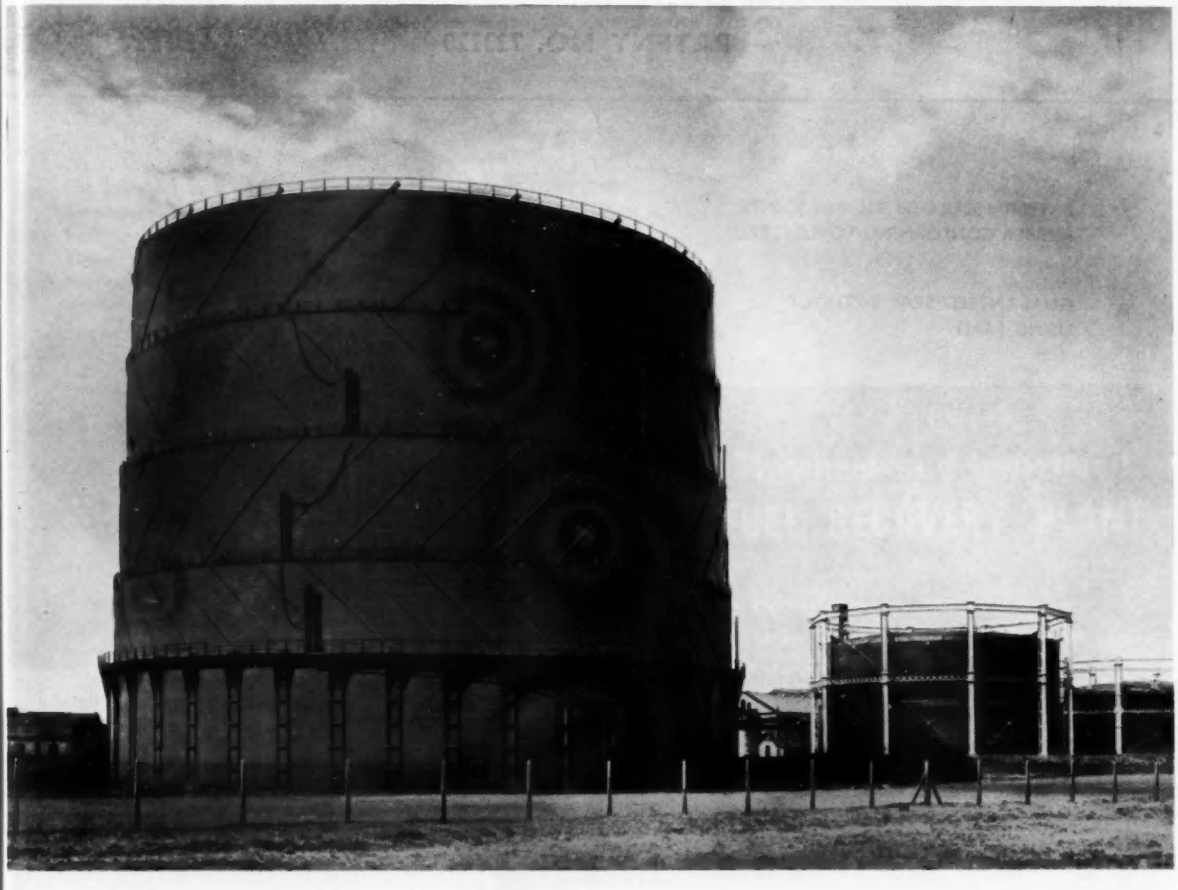
The Douglas Pump has given excellent service on many different duties in the Gas Industry. May we have the opportunity of placing this service at your disposal too?

LONG SERVICE PUMPS

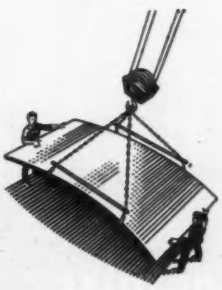
WILLIAM DOUGLAS & SONS, LIMITED, DOUGLAS WHARF, LONDON, S.W.15. Telephone : PUTney 8181

WHESSOE —

AT BISHOP AUCKLAND



WHESSOE BUILDS WELDED GASHOLDERS



This 4 lift gasholder, which was built at Bishop Auckland by Whessoe for the Northern Gas Board, has a capacity of 3 million cubic feet, its steel tank being 183′ 3″ in diameter.
Like all gasholders built by Whessoe it is of welded construction and possesses consequent advantages. These include complete tightness, avoidance of corrosion pockets and lower repainting costs. Contributing to the latter feature are the form of construction and the pre-treatment of all materials by the Footner Phosphoric Acid Pickling Process.
During erection careful checks (including radiography of butt welds on the tank) were made to ensure high quality welding.

AN ADVERTISEMENT OF WHESSOE LIMITED DARLINGTON • LONDON: 25 VICTORIA ST. S.W.1

W.100

PEART of HYDE

THE PEART (PATENT)
LEADLESS SPLIT COLLAR

PATENT NO. 733220

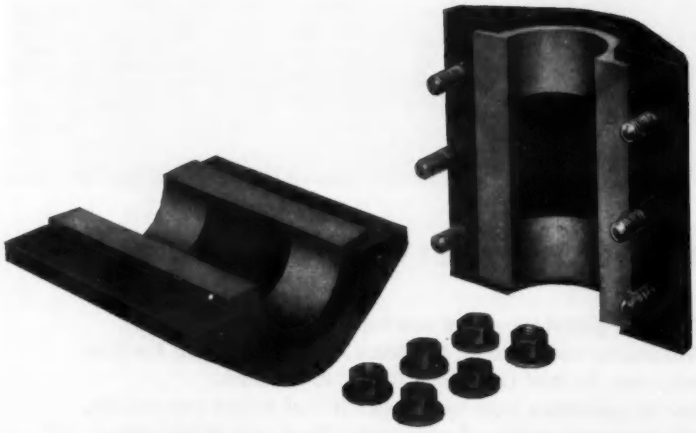
★ PATENT MOULDED RUBBER JOINTS, RUBBER CONFORMING TO B.S.S. 772.

★ GUARANTEED SEAL WITHOUT USING LEAD

★ EASILY TRANSPORTED.

★ ONE SPANNER ONLY REQUIRED.

★ CAN BE FITTED IN TEN MINUTES.



★ CAN BE SUPPLIED WITH OR WITHOUT BOSS.

★ DRILLED AND TAPPED ½"-2" B.S.P. IF REQUIRED.

★ TESTED UP TO 350 lbs. p.s.i. HYDRAULIC PRESSURE.

E. PEART & CO. LTD.

ONWARD WORKS · HYDE · CHESHIRE

TELEPHONE: HYDE 3545/6

THEY didn't know they were being extravagant

But today the cold wind of economic necessity demands that every last ounce of solid fuel should be used to its best advantage—even the ashes! Therefore, in the national interest, every Gas Works should investigate the advantages of installing a Fuel Recovery Plant in their works.

This new and improved FUEL RECOVERY PLANT

In a great many Gas Works there is a considerable percentage of usable coke in the pan ash which could be turned into a valuable asset by this Waller Fuel Recovery Plant. Twenty-five years experience in the building of plant for recovering fuel from ashes has enabled us to design and build this new and improved model which incorporates several unique features. You are invited to see the demonstration plant in operation at our works.

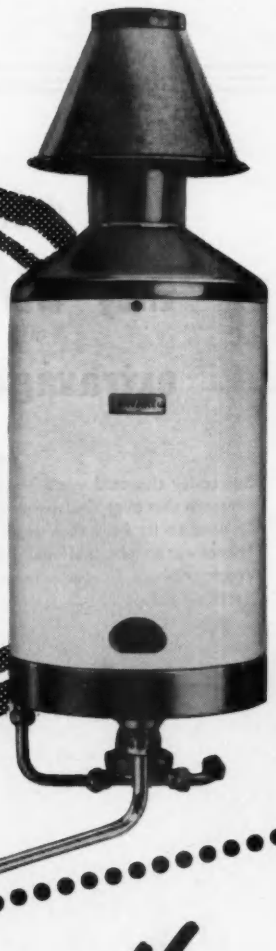
Member of the Society of British Gas Industries

GEORGE WALLER & SON LTD

PHOENIX IRON WORKS, STROUD, GLOS.
Telephone : Brimscombe 2301-2

The bath water heater you can really SELL!

the Ewart S.140 AV



The famous Ewart S.140 has always been the lowest priced instantaneous bath water heater on the market. Now, newly re-styled as the Ewart S.140 AV, this easy-to-sell heater is better than ever—and stays as cheap as ever!

Improved manufacturing techniques have enabled Ewart to add to the S.140 these important new features:—

1 AUTOMATIC VALVE
2 PILOT SAFETY DEVICE
3 BUILT-IN VOLUMETRIC GAS GOVERNOR

at no extra cost!

Top value for safety, reliability and money—that's the Ewart S.140 AV. And that's why the introduction of this splendid heater presents the biggest opportunity for years for gas salesmen to sell bath water heating by gas—the *EWART* way.

Display the Ewart S.140 AV in your showrooms. Full details and specification available on request to the manufacturers.

with *three* new features giving added safety for the same low cost!

EWART **S.140 AV**

LIST PRICE £21·10·9 (TAX PAID)

It's in production NOW!

EWART AND SON LTD · 255 NORTH CIRCULAR ROAD · LONDON, · N.W.10 · TEL: WIL 1234

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PERFORMANCE

"I found it extremely difficult to keep the speed of the Bedford down below 35 m.p.h., such is its lively performance."

The Commercial Motor, June 21st, 1957
Road Test of the Bedford 6-tonner

BEDFORD'S OWN DIESEL

ECONOMY

"At an average speed of 26 m.p.h. (laden), the total fuel used indicated a rate of 18·1 m.p.g., which is an extremely economical figure . . . unladen and when driven at normal speeds, a consumption rate of 26·4 m.p.g. was returned."

The Commercial Motor, June 21st, 1957

"Remarkable fuel economy . . ."

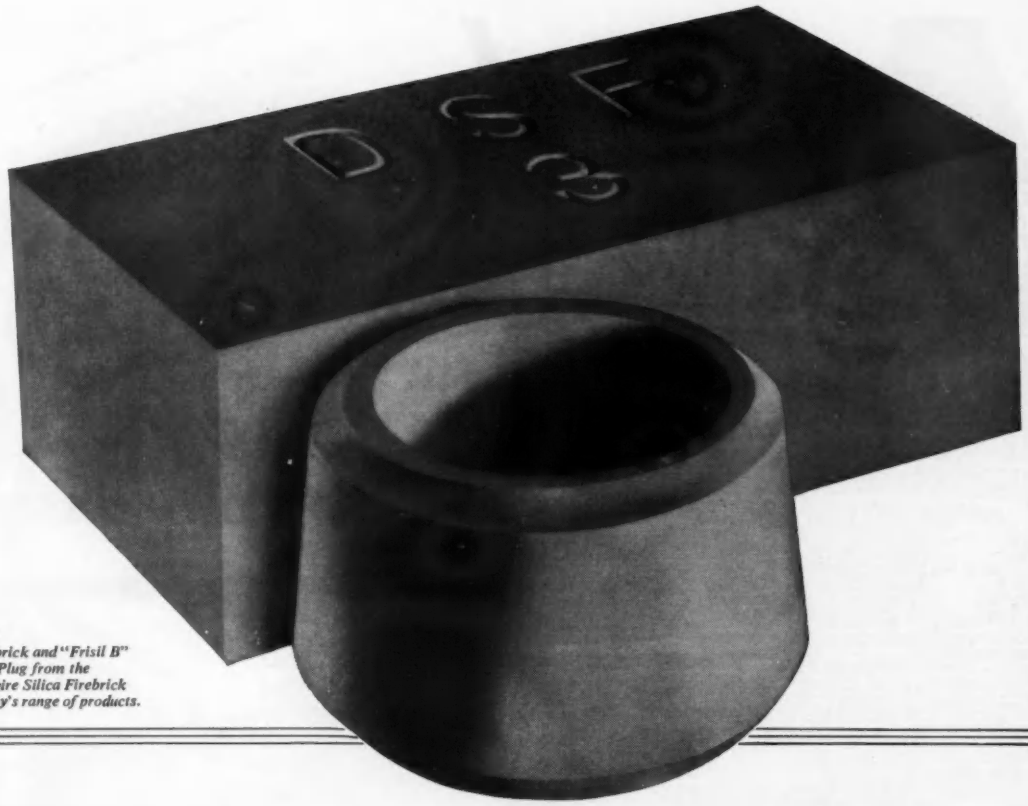
says

THE COMMERCIAL MOTOR

"Fast acceleration . . . remarkable braking efficiency . . . good hill-climbing performance . . . extremely economical . . . " These are just a few of the comments made by the Commercial Motor following a recent road test of the heavy-duty Bedford 6-tonner powered by Bedford's own new diesel. And when it comes to performance with economy the new Bedford diesels *prove* that they cut the cost of power to lower levels than ever before. This diesel unit is an option for the Bedford normal and forward control 4-ton, 5-ton and 6-ton range. It is the most modern 6-cylinder direct injection diesel on the market and top value for money. Get full details from your local Bedford dealer, or write for literature to Vauxhall Motors Ltd., Luton, Beds.

CUT THE COST OF POWER WITH

Bedford



D.S.F.3
Square brick and "Frisil B" Nostril Plug from the Derbyshire Silica Firebrick Company's range of products.

The greater the insistence on furnace efficiency, the greater the need for

DERBYSHIRE SILICA REFRACTORIES

DERBYSHIRE "S" and "D.S.F."
(90% Silica)

Refractories for all purposes including Vertical and Horizontal Retorts, Soakers, Puddling Furnaces, Reheating and Annealing Furnaces, Forge Furnaces, Checkers, Cupolas and Glass Furnaces.

Other D.S.F. products include
PEAKSIL *(95% Silica)* FRISIL *(Sillimanite)*
DUROSIL
(The new British Plastic Refractory)
and DOME INSULATION *(Diatomite)*

DERBYSHIRE SILICA FIREBRICK CO., LTD.
FRIDEN · HARTINGTON · NEAR BUXTON · DERBYSHIRE
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Customs of the World....

The Judge and his Nosegay.

The ancient custom of presenting the judge with a nosegay persists as a reminder of the days when the obnoxious presence of the felons' cells below the court room could be offset by the fragrance of flowers.

The World wide use of Staveley Pipes for gas, water and sewage mains has done much to bring high standards of hygiene and health to up to date communities today.

STAVELEY

The only makers of SAND SPUN PIPES in Great Britain

SAND & METAL SPUN PIPES
(with Run-Lead or Flexible Joints)
for GAS AND WATER MAINS

THE STAVELEY IRON & CHEMICAL CO. LTD.,
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Don't do it the hard way...

"APEXIORISE" TO ECONOMISE!

Why take foolish risks in the maintenance of Boilers and Steam Turbines when there's a safe, easy and economical method—treatment with '*Apexior Number 1*'.

Two coats, easily applied by brush or mechanical equipment to the internal surfaces of Boilers, Turbines, Steam Pipes, Hot Water Tanks and wherever wet-heat temperatures between 175° - 1000° F. are encountered, afford complete protection against corrosion for at least a year.

'*Apexior Number 1*', which bonds to the metal—almost becoming part of it—not only greatly reduces scale, but alters its character so that what forms is easily removed, usually without the use of chipping hammers.

Follow the lead of the world's foremost boilermakers, who for fifty years have proved the efficiency of '*Apexior Number 1*'.

Please send for your free copy of the "Apexior" Manual.

DAMPNEY'S APEXIOR REGISTERED

prevents corrosion in steam-raising plant

For cold-wet surfaces below 125°F use "Apexior Number 3"

BRITISH PAINTS LIMITED *"Apexior" Division*

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COMFORT...

with controlled warmth

The "Landmark" is an ingenious convector gas fire of outstanding merit and distinguished design incorporating a patented "fool-proof" ignition device which is reliable and easy to operate. This device ensures complete security should there be any failure or interruption of the gas supply.

A special heat exchanger is fitted which transmits additional warm air through the louvres giving perfect convection. The fire is also provided with an approved dress guard.

The "Landmark" will enhance any room with its eye appeal and golden bronze superfine finish.

STOVES LTD

RAINHILL · LIVERPOOL

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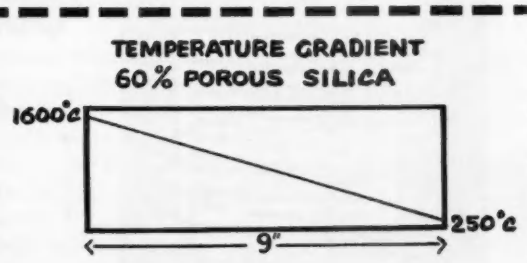
CONSETT POROUS SILICA

A really high-temperature INSULATION...

- Developed and manufactured by the Consett Iron Company Limited, "Porous" Silica Insulating Bricks have become established as an important addition to the existing range of refractories.
- Possessing the advantages of a normal silica brick combined with high thermal efficiency, "Porous" Silica offers to the furnace builder a spalling resistant silica refractory suitable for hot-face insulation at high temperatures.
- Already in wide use in the glass industry for roof insulation "Porous" Silica Brick is also suitable for the construction of kiln roofs and side walls where its light weight and insulating properties are important factors in design and service.
- "Porous" Silica Bricks are made in two grades, 60% and 50% porosity, the latter possessing a higher mechanical strength, rendering it the most suitable for constructional work.

Further information will be gladly supplied on request.



The high insulation value of "Porous" Silica considerably reduces the total wall thickness necessary.

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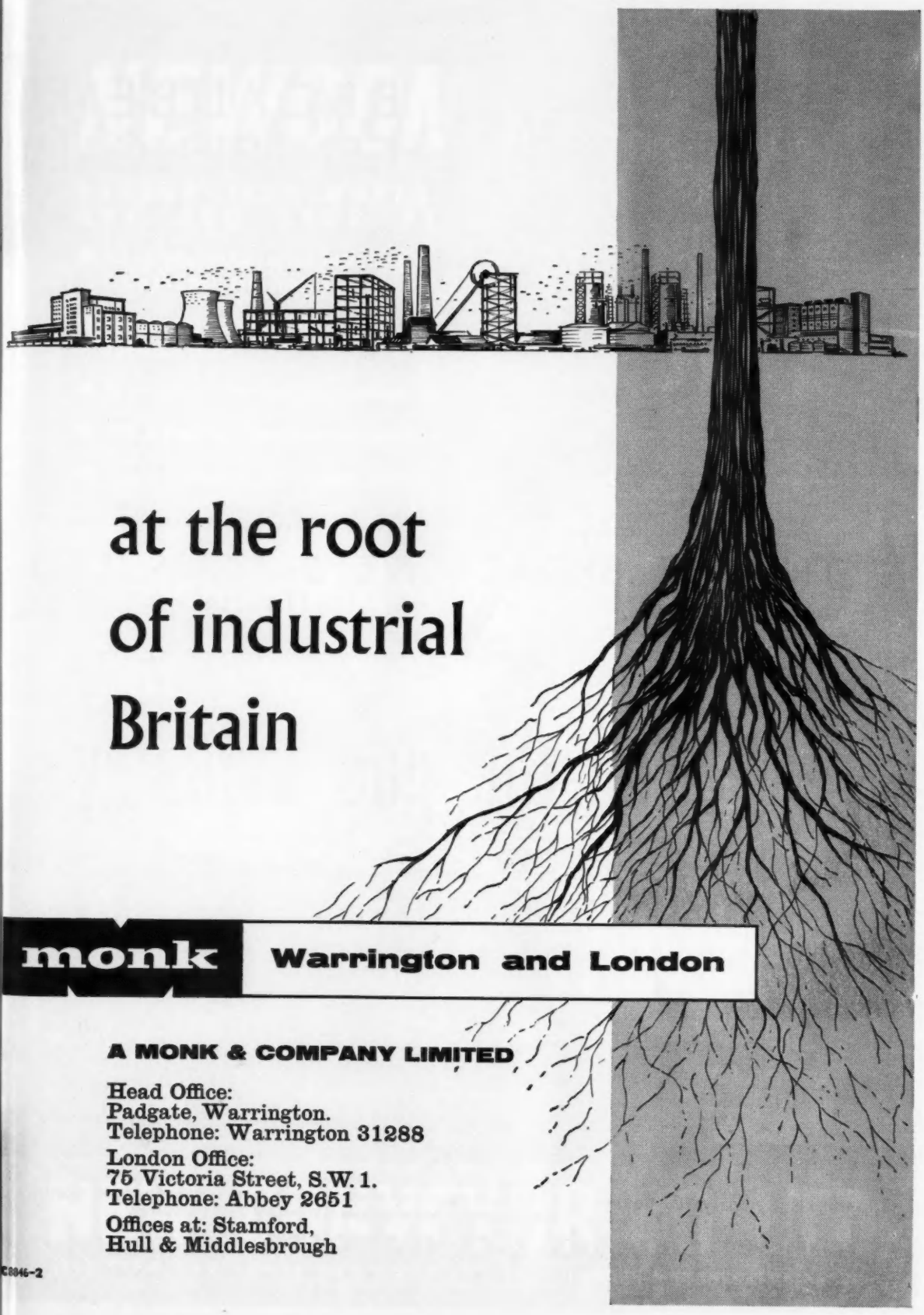
CONSETT · CO. DURHAM · ENGLAND

Telephone: Consett 341 (12 lines) **Telegrams: STEEL PHONE. Consett**



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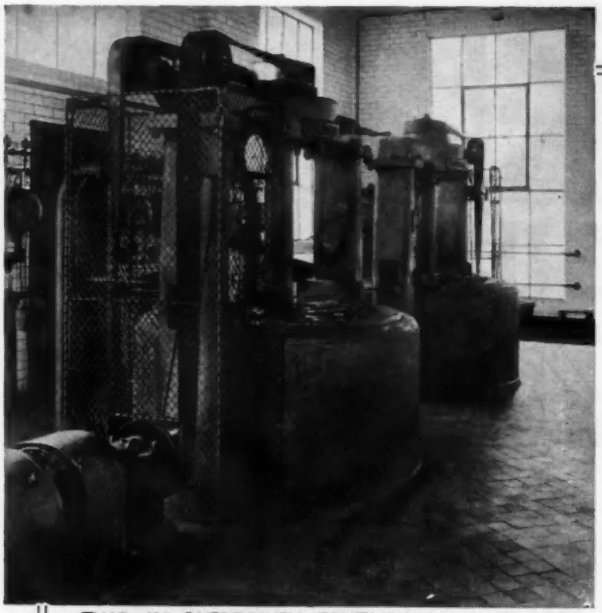

TWO 48" OVERDRIVEN CENTRIFUGALS WITH STEEL BASKETS DRIVEN BY SINGLE SPEED FLAME-PROOF MOTOR AND BELT THROUGH VARIABLE SPEED HYDRAULIC COUPLING

BROADBENT CENTRIFUGALS

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THOMAS BROADBENT & SONS LTD.

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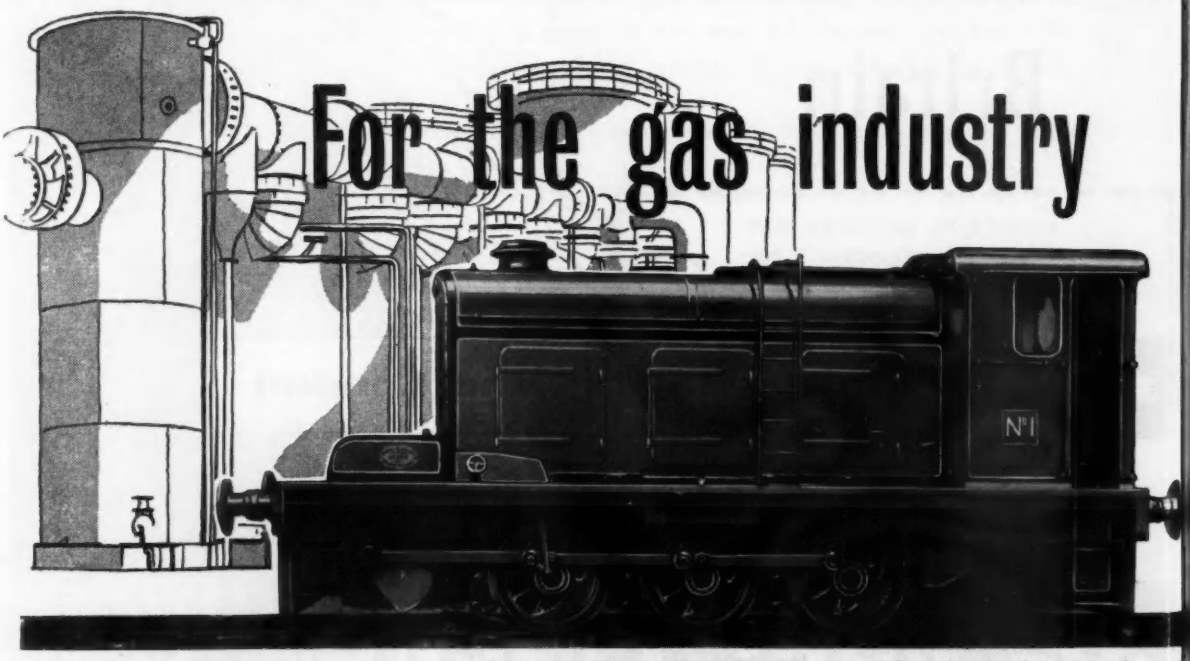

Pioneers for nearly 100 years

A 200 h.p. Diesel Locomotive weighing 32 tons specially designed and constructed for the heavy and arduous service to suit the varied conditions in the Gas Industry. Designers and Builders of all types of Steam and Diesel Locomotives.

HUDSWELL CLARKE & COMPANY LTD LOCOMOTIVE ENGINEERS

RAILWAY FOUNDRY, LEEDS, 10

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- Complete installation including foundation and electrics
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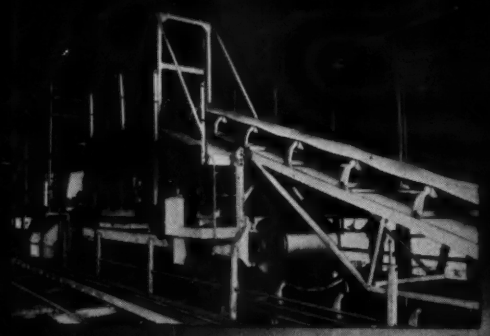

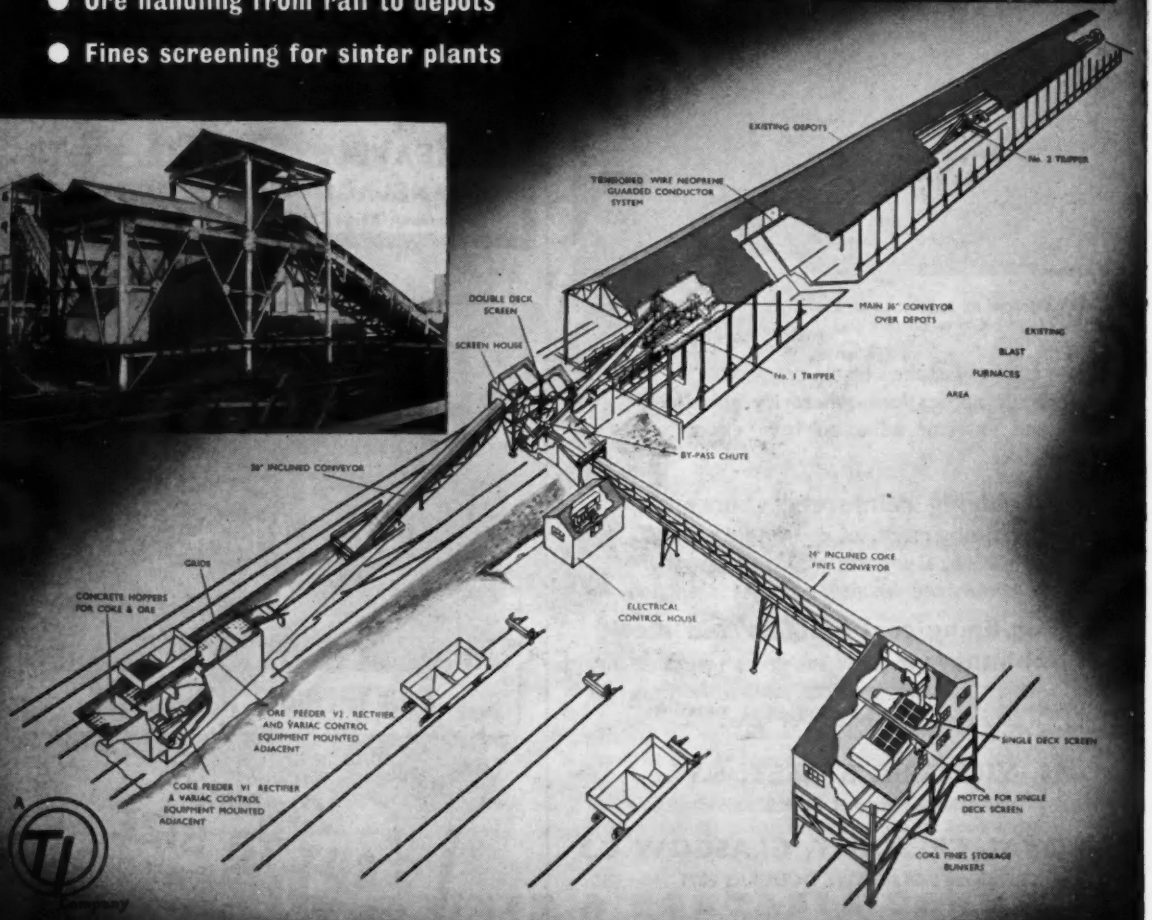
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No. 2 TRIPPER
TENSIONED WIRE NEOPRENE GUARDED CONDUCTOR SYSTEM
DOUBLE DECK SCREEN
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MAIN 36" CONVEYOR OVER DEPOTS
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NEW CONVEYOR CO LTD

HEAD OFFICE: SMETHWICK BIRMINGHAM 40 ALSO AT LONDON MANCHESTER GLASGOW

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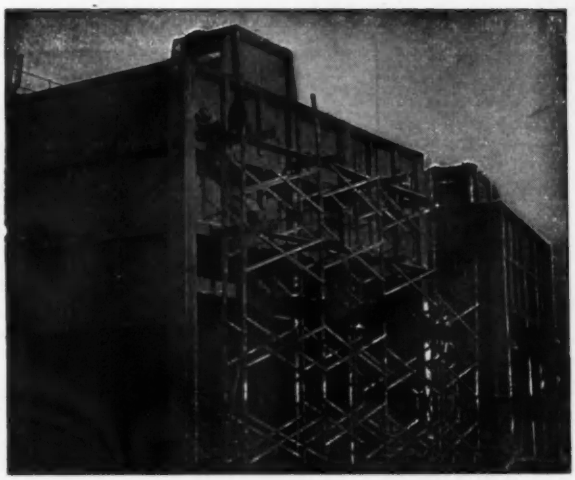
Gunite



One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking

Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have exceptional value.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

For lining coal bunkers and steel chimneys it possesses great resistance to corrosion and protects steel-work from the abrasive action of coal or coke.

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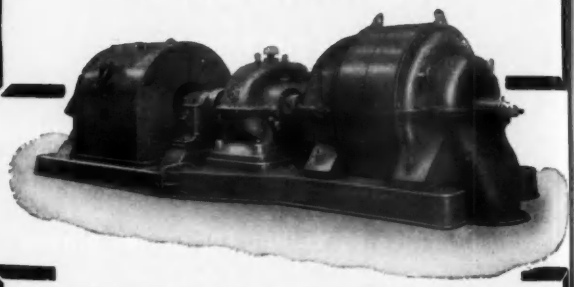
THE CONCRETE PROOFING CO., LTD.

Handbook "GUNITE" sent on request

TURBO-COMPRESSORS & EXHAUSTERS FOR AIR AND GAS

★ ★ ★

We build a complete range of Compressors & Exhausters for air and GAS, suitable for all purposes connected with the GAS industry, including Turbo-Compressors for large capacities, as illustrated below



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RANELAGH WORKS, IPSWICH.
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MINERAL WOOL FELTED SLABS FOR THERMAL INSULATION

Supplied **CUT TO SIZE FOR YOUR PRODUCTION LINES**

Write for our new Technical Brochure

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35 years' know how

GOES INTO EVERY JOHNSON CONVEYOR!

Since George Fosbery Lyster first experimented with band conveyors at Liverpool Docks in 1868 three-quarters of a century has seen great extension and widespread use of his idea. During the last thirty five years Johnson's have played a proud part in this development. Today, the great number of Johnson Conveyors of different types in use, stockpiling, reclaiming, transporting and loading basic fuels and raw materials, is evidence of their pre-eminence in this field. In fact, there is a Johnson conveyor (with Loband Loader, or Portable Feed Hopper) admirably suitable for practically any industrial application.

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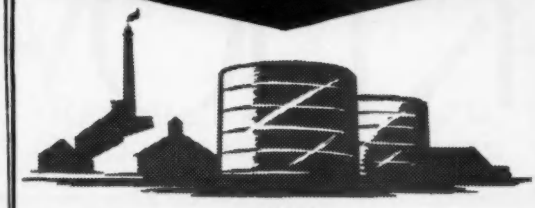

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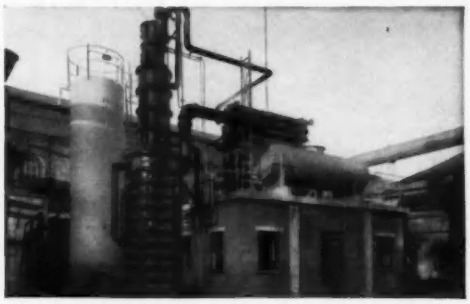

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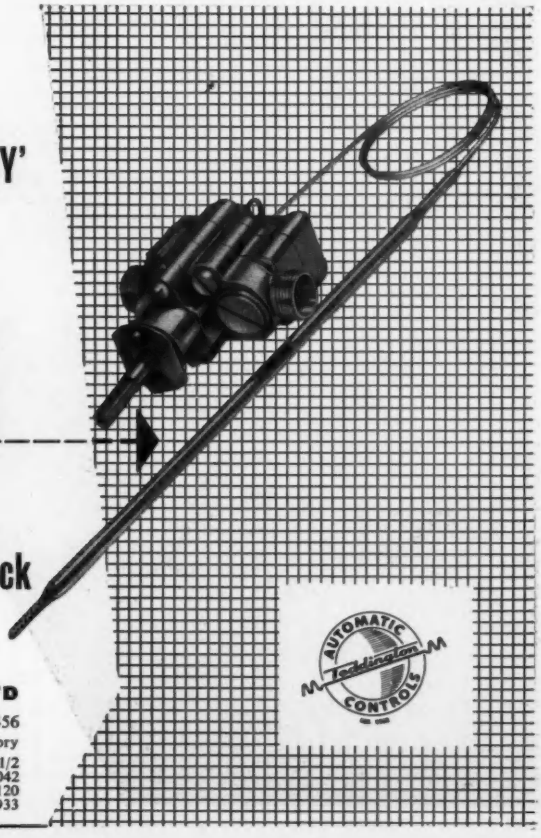

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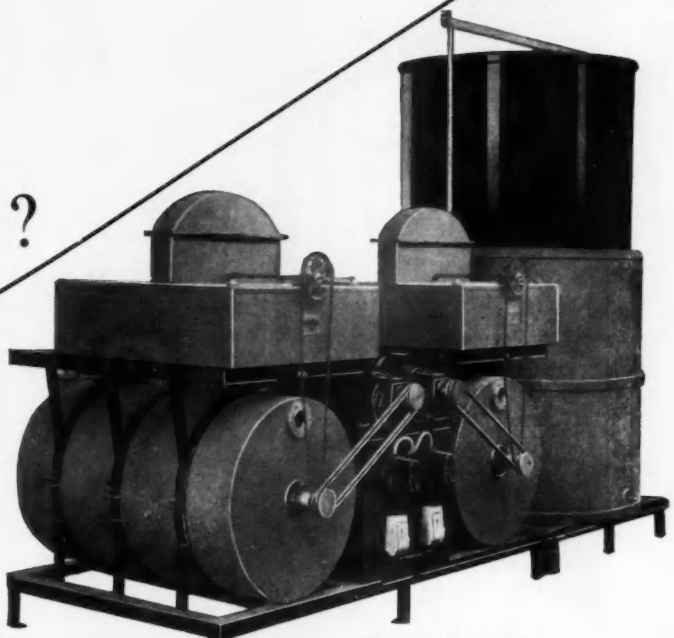

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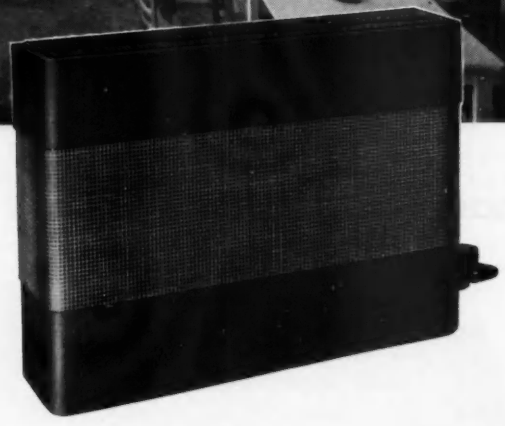

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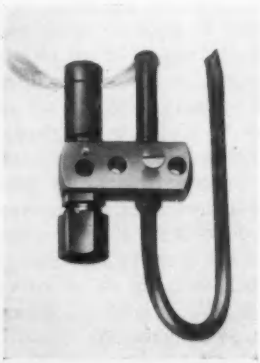

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VOL. 291 *NO. 4912* *September 4, 1957*

109TH YEAR

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Gas Journal

VOLUME 291. No. 4912. SEPTEMBER 4, 1957. 109th YEAR

Increasing the Domestic Load

TO say that it is no use making gas if you cannot sell it is a trite statement but no less true than the fact that only a comparatively modest increase in sales would permit gas to be sold at a more attractive price. Clearly then we should sell more gas and the obvious question is *how*? Before venturing a few suggestions we would like to comment briefly on the industry's attitude to sales.

It is generally agreed that we are suffering from an over-long spell of what might be termed 'engineer domination.' In other words, there has been—and remains even today—a reluctance to admit that the man who sells the gas is as important as the man who makes it. This shared importance has been accepted in other industries without demur because it has been supported by facts. In the gas industry it seems as though those facts have been wilfully overlooked, at least until they forced themselves upon us so harshly that they could be ignored no longer. 'All right,' said the industry reluctantly, 'we will build a real sales organisation'—only to find that although there were good men and true in the sales ranks, the years of neglect had nipped the more promising buds and there was a serious lack of men with genuine sales vision and a complete dearth of men who had had executive experience in sales organisations outside the industry. That situation obtains today and it is extremely serious. As yet there are no signs of the right sort of incentives being given to men of real talent or of a systematic building up of a sales force in which brilliant sales planning, personal salesmanship, and technical ability have their proper places. What we are suffering from in particular is a lack of vision, a preoccupation with immediate problems which obscures wider horizons. There is an apprehension in the air born of that depressing trend shown in the figures of domestic consumption. The talk is of how we are going to *hold* the load, not of how we can *increase* it. Is it necessary to be so guarded and defeatist in our attitude towards the future? We do not think so.

Broadly speaking, there are two ways to increase gas consumption—by selling gas to people who have not used it before, and by selling it to existing consumers. Let us take the two lines of approach in turn. New consumers mean new building and the fact of the matter is that although the gas industry's contact with local authorities is for the most part very good, its contact with private builders leaves a great deal to be desired. In general, these builders tend to have a bias against gas and the only way to change their attitude is either by carefully designed financial inducements or by a considerable extension of dealer schemes—probably both. These dealerships have not yielded the results hoped for, but that does not mean that the idea is unsound. Indeed, more than one paper at the forthcoming Gas Sales and Service Conference is concerned with ways and means of making these schemes work more satisfactorily.

It is extraordinary how little is really done to step up the consumption of gas by existing consumers—a subject, by the way, which is hardly mentioned in the conference papers. As we see it, the first requirement is an extension of the types of appliances we have to offer, and here the Americans have set us an inspiring example. Gas-heated tumbler dryers, dish washers, and even incinerators would provide a legitimate and logical field for developing the domestic load. Where are the appliances to sell? Broadly speaking, they are not available, presumably because manufacturers lack faith in the industry's ability to sell such products through its very limited sales outlets. But given the right encouragement and technical assistance these appliances could be produced and, in our view, sold. Obviously it would be necessary to bring their advantages to the public's attention, a process which would take time, but this has been done very successfully in the United States and is being achieved in this country by our competitors. Quite apart from the load-building potentialities of these additional appliances, it need hardly be emphasised that their value to the industry in terms of prestige would be tremendous.

There are other lines of pursuit. For example, there seems to be a great deal of muddled thinking about the competitive merits of gas-fired central heating. Despite misguided ideas to the contrary, an excellent case can be made out for the gas-fired boiler—particularly

within a certain range—and this is a load which is languishing for lack of spirited attention. We shall shortly be devoting a special issue of *Gas Service* to the subject. Again, there are worthwhile things to be done in the substitution of gas fires for old-fashioned solid fuel installations in property coming under the clean air rule (the South Eastern Gas Board deserves particular credit for publicising this type of conversion); although such work is likely to apply mainly to the poorer class property, the load to be picked up is well worth having.

Lastly, there is the whole business of putting over the gas story and, frankly, we do not feel the gas industry is being very clever in this respect. There is a lamentable absence of glamour about our publicity and here again we would do well to take a leaf out of the Americans' book. Their throw-away leaflets and magazine advertisements are far more colourful and convincing than ours. Indeed, we might do worse than bring the American housewife's devotion to gas to the notice of her British counterpart—a sort of hands across the sea approach. After all, gas is the main cooking fuel in well over 70% of the houses in urban areas in America and this high saturation of gas cookers in the big cities may be something of an eye-opener for the British housewife who probably fondly imagines that the Americans have all-electric homes; to the best of our knowledge cooking by electricity in American cities amounts to little more than 5%. We can visualise photographs of contrasting kitchens and such slogans as 'From Maine to Manchester, from Boston to Bolton, Gas is the Housewife's Favourite Fuel.' And so on.

To return to our main theme: We *must* increase the domestic load. If, thanks to good publicity and solid selling, coal- and oil-burning appliances can be sold in this year of grace 1957, despite the difficulties of labour, storage and maintenance, we certainly ought to be able to sell gas—a superb fuel which it is in the nation's interest to foster.

Engineering Exhibition

IT is always something of an experience to go to the exhibitions at Olympia—especially if they are staged in the Grand Hall. But it is even more impressive when an exhibition has grown so large that it takes up all three exhibition halls. Thus the Engineering, Marine, Welding and Nuclear Energy Exhibition goes on expanding in much the same way as its name goes on lengthening. By the inclusion of nuclear energy, it becomes possible for certain large firms that have formed subsidiary companies with other equally large firms for the express purpose of exploiting the development of atomic energy by forming operating units that can undertake the construction of the immense chemical engineering units involved, to show their wares in their own right. In this way the general public and others can begin to understand how advanced we are in this country in the building of these very large pieces of plant.

This exhibition is only held every other year, which allows more progress and development to take place than if it were held annually. It is in fact noteworthy that the first of these exhibitions was held in 1906, and that the present one celebrates the second 50-year period of its existence, which goes a long way to show how continuous is the progress being made in engineering design and in the ingenuity being displayed in the construction of such things as automatic welding and cutting machines. This side of the exhibition is particularly interesting since it indicates the trend of construction and fabrication work in the future. It is not so very long ago that large engineering shops were made unbearable for everyone except the more hardened worker by the din of the rivetting machines, but now in some of the most modern this has been replaced by the occasional green flash of the arc welder or the sizzle of the oxy-acetylene welding torch. In the small engineering shop the spot welder for lighter work is both quick and efficient, while the electrical resistance welder takes the place of the old blacksmith's forge. The Empire Hall at Olympia has been given over to this side of the engineering industry, and in here all the welding exhibits are confined. If the visitor enters the exhibition by the Grand Hall his first impression will be the size and extent of modern engineering products which range from large steam turbo-alternators, diesel engines, British Railways express locomotives, the construction of very large capacity coke ovens to hydraulic automotive equipment.

It is when he has seen these products, displayed with skill and in attractively designed stands, that the visitor becomes aware of the Welding Exhibition, where the means of construction of so much of the equipment he has just seen is evident. With this expansion of the use of welding in fabrication work comes the need to ascertain the soundness of the weld. Today the finish of much welding work is of such a high standard that it cannot be detected by the naked eye, but X-ray techniques now available are so efficient that flaws in welding are easily detected. This being so all such work is most rigidly inspected by X-ray and gamma-ray methods, and if the work is not between 99% and 100% of the standard set, it will be cut apart and the work repeated. These testing techniques have given birth to an ancillary industry to develop these testing methods.

It is a pleasant thought on touring these exhibitions that every development in the design of some machine, and every new device for improving the means of constructing it, strengthens our competitive position in European and world markets.

Underground Gasification Progress

AT last the pilot power station at Newman Spinney in Derbyshire, to be operated in conjunction with the N.C.B.'s underground gasification project, is to get started. Consent for its construction has been given to the C.E.A. by the Minister of Power and it is hoped that the plant will be operating by the end of next year. The station, which will be temporary, will contain one 3,750 kW. turbo-generator and associated boiler, and there will be an induced draught cooling tower having a capacity of 250,000 gal. of water an hour.

This will, of course, be an experimental station, but even so its life is to be singularly short. Conditions attached to the consent are that all buildings, plant, and equipment shall be removed and the site restored to its present state at the end of a period of ten years expiring at December 31, 1967, and that the local planning authority shall be given an opportunity to comment on final details of the proposals before works are commenced.

Personal

MR. W. J. EDWARDS has been appointed Regional Installation Superintendent to the Southern Gas Board's Southampton Region. Mr. Edwards received his early training with the West Bromwich Gas Department, subsequently moving to the Oxford Gas Company in 1947 as District Inspector, being promoted to Fitting Superintendent in 1951. In 1952 Mr. Edwards moved to the North Eastern Gas Board, being appointed Distribution Superintendent, and later to the North Western Gas Board, Liverpool, as Deputy Installation Officer, in 1955. In his new appointment Mr. Edwards is responsible for an area covering Southampton, Salisbury, Andover, and Winchester.

MR. BERNARD PRESTON, Sales Representative in the Carlisle area of Northern Division, has been appointed Assistant Divisional Manager in the Lancashire Division by the National Benzole Co. Ltd. MR. JOHN E. PEARMAN, sales representative in the Plymouth area of the Company's Bristol Division, has been appointed Assistant Divisional Manager, Sheffield Division. MR. T. F. MACFARLANE, Assistant Divisional Manager, Lancashire Division, has been appointed Manager, Consumer Trades, at the Company's Head Office in Buckingham Gate, London, S.W.1. MR. DENNIS D. FLYNN, Sales Representative, has been appointed Assistant Manager in London Division.

MR. J. O. BLAIR-CUNYNGHAME has been appointed a full-time member of the National Coal Board in succession to Sir Andrew Bryan. Mr. Blair-Cunynghame, who was born in 1913, did research work in the coal industry and afterwards conducted research at Cambridge into the selection of university graduates for business. He was chief Personnel Officer of British Overseas Airways Corporation for seven years before joining the Coal Board in 1955 as Director-General of Staff.

MR. C. A. F. BENNETT, formerly Area Manager on the territory of the South Eastern Gas Board, has been appointed Area Manager of the territories of the South Eastern, North Thames, and Eastern Gas Boards, by Ascot Gas Water Heaters, Ltd., and Ewart & Son, Ltd. Mr. Bennett is responsible to Mr. G. Jeffs, Sales Manager (London). The following will be responsible to Mr. Bennett: *South Eastern Gas Board*—MR. F. C. HILLIER, Senior Representative, and MR. W. H. COTTRELL (formerly Representative for Ewart & Son, Ltd., on the South Eastern and Southern Gas Board Areas); *North Thames Gas Board*—MR. G. SPEAKMAN, Senior Representative (formerly Senior Representative Wales Gas Board Area) and MR. W. J. COLLISON; *Eastern Gas Board*—MR. F. T. APPLIN, Senior Representative and MR. H. C. KEY. MR. G. C. HOGG has been appointed Senior Representative on the Wales Gas Board Area, responsible to Mr. J. M. Backhurst, Southern Manager. Mr. Hogg was formerly a Representative for Ewart & Son, Ltd., on the Wales and South Western Gas Board Areas.

Diary

September 13.—SCOTTISH G.C.C.: 26, Drumsheugh Gardens, Edinburgh, 3. 2.30 p.m.

September 18.—I.G.E., SOUTH WESTERN SECTION: Exeter. Visit to Exeter Manufacturing Station. 'The Specialised Vehicle—Its Place in the Transport Fleet,' by A. W. Mahoney.

September 21. — EASTERN JUNIORS: National Farmers' Union Headquarters, Park Street, Lincoln. 11 a.m. General Meeting and Presidential Address.

September 23. — WEST MIDLANDS G.C.C.: Committee Room, Gas Offices, Edmund Sreet, Birmingham 3. 2.30 p.m.

£850,000 COKE OVEN PLANT IN OPERATION

THE Workington Iron and Steel Company, which for 21 years has been providing coke oven gas for the Cumberland gas grid, has brought into operation a new £850,000 battery of 53 ovens which has taken four years to design and install.

Present at the official commissioning of the new plant—performed by the Director and Works Manager, Mr. D. R. Wattleworth, who predicted more than ten years ago that coke oven gas would be supplying Workington homes—were Mr. E. Crowther, Chairman of the Northern Gas Board, and Mr. J. E. White, Deputy Chairman.

The present daily make of the Workington plant is 120 mill. cu.ft., half of which is taken by the Gas Board and purified at the Workington gasworks before going into the grid.

Mr. Langton Highton, Director and General Manager of the Workington Iron and Steel Company, commended the Northern Gas Board for its enterprise in making the gas grid possible.

CLEANER AIR

Manchester Public Health Committee has requested the Housing Committee to provide fireplaces suitable for burning coke with gas ignition in all new dwellings and in all dwellings where there may be in future a change of tenants; also to require as a condition of tenancy, that only authorised fuels be used.

CORRESPONDENCE

Electricity in Gasworks

DEAR SIR,

There are two points I would like to comment upon in your editorial, 'Electricity in Gasworks.'

In one or two instances the determination of the gas engineer to avoid the use of electricity was carried very far indeed. The great horizontal retort houses of the South Metropolitan, Granton (Edinburgh) and Cardiff are cases in point. But the most amusing was the quite big installation of C.V.R.'s (1920) at Northampton; here the power was transmitted from gas engines by an amazing system of shafts and gearing.

But in the matter of stoking machinery there is a more important point. It was quite early in the century that we first applied electricity direct to the stoking machine. Prior to that we had already applied it to the air compressor, for compressed air very early ousted steam and hydraulic power from the position. Our first difficulty was the flimsy and (as you remark) unprotected design of the motors and particularly the switchgear offered to us. At that time the electrical engineer himself had not advanced very far beyond lighting and other 'light' applications of electricity to industrial uses. The gas engineer had to apply himself to an examination of the electrical appliances and to insist on sound mechanical construction of motors and switches and to their protection from dust and heat before he could fit them to the stoking machine. These measures led to the 'gasworks motor' and dust and weatherproof switchgear to which we are now accustomed and which came in so useful when we came to the vertical retort with all its modern electrical equipment. In all this the electrical engineer cooperated willingly enough but the initiative had to come from the constructional engineer of our own industry.

Yours faithfully,

T. A. TOMLINSON.

82, Longley Lane,
Northenden,
Manchester.
August 29, 1957.

MORE GAS

Supplies of gas to the Northern Gas Board will be stepped up from 2.5 mill. cu.ft. a day to 4 mill. cu.ft. a day shortly when 11 new Woodhall-Duckham under-jet compound coke ovens are put into operation at the Evenwood (Co. Durham) works of Sadler & Co., Ltd., the Middlesbrough chemical manufacturers. Among the few independent coke producers in the country, the firm also hopes to improve its domestic and Continental sales in this direction also, as well as to increase distillation of by-products at Middlesbrough. The development is expected to cost about £250,000.

Modern Gas Fires Win the Initiative

With 70% efficiency they can beat electric and solid fuel appliances, say R. & A. Main, Ltd. technical men. But care must be taken over correct installation.

RECENT developments in the design of gas fires have placed gas in a much more favourable position than electricity or solid fuel for space heating, and regular increases in coal prices are causing many householders to consider abandoning the traditional coal fire, say Mr. A. J. Adam (Chief Chemist) and Mr. G. A. Vasey, of R. & A. Main Ltd.

The latest gas appliances have a large convection component and their over-all bench efficiency approaches 70%. With gas at 2s. per therm they can give the same heat service at lower cost than the normal coal fire with coal at £8 10s. per ton, point out Adam and Vasey. Over much of the country the price ratio between gas and coal will be even more favourable.

Importance of Fitting

But if a large increase in the use of gas for space heating is to be realised, they warn, it is important that all gas fires be properly fitted, since the best efforts of the appliance laboratory may be completely nullified if the installation procedure is such that the appliance vents an excessive volume of room air into the chimney. The importance of correct installation becomes apparent when the concept of room efficiency is considered.

Opinions vary, but there is evidence that some 600 cu.ft. of air is required for ventilation per person per hour, so that three to four people will require 1,800 to 2,400 cu.ft. per hour. Air flowing through the room in excess of the desired figure is being heated unnecessarily and represents a heat loss, since all the warmed air passing up the flue must be replaced by cold air drawn in from outside.

Assuming that the desired ventilation rate of a room is 2,000 cu.ft. per hour, the room efficiency is determined by installing the fire in the fireplace and measuring the rate of flow of air and products Q, passing through the flue when the appliance is in use. The bench efficiency E is then determined in the normal way using a flue calorimeter and a similar flow rate Q.

The room efficiency is then expressed as:—

$$\frac{RE-(Q-2000)\ \Delta t.S}{R}$$

where R = input in B.Th.U. per hour, Δt = difference between room temperature and outside air temperature in °F., and S = specific heat of air = 0.019.

While the modern gas fire can be designed so that its bench efficiency is not appreciably affected over a wide range of flow rates, the same is not true of the room efficiency, say Adam and Vasey.

Thus a fire of rating 18,000 B.Th.U. per hour might give a bench efficiency of 65% at a flow rate of 2,000 cu.ft. per hour, but if installed incorrectly with excessive chimney break area, so that the flow through the room actually became 5,000 cu.ft. per hour then the room efficiency, assuming a difference of 30°F. between room and outside air temperatures, would become:—

$$\frac{18{,}000\times 0.65-(5000-2000)\ 30\times 0.019}{18{,}000}$$

$$=55.5\%.$$

Examination of the first equation indicates that the room efficiency falls as the ventilation rate Q increases and as the difference in air temperatures Δt increases. This last is particularly important, since it indicates that the room efficiency of a badly installed gas fire is at its lowest at the time when its maximum heat output is most needed, i.e., in the coldest weather. It is also at such a time that the presence of cold draught round the ankles becomes most apparent. This is a normal consequence of excessive chimney flow and requires an increase in the average room temperature and, therefore, an increased consumption of gas to re-establish 'comfort conditions.'

The importance of installing gas fires correctly, i.e., as the maker intended them to be installed, is thus very real.

It is relatively easy to make a satisfactory installation when the face of the tiled surround is flat, Adam and Vasey point out. In such cases it is only necessary to ensure that the top edge of the fire and lower corners contact the surround, and that unevenness of the hearth or projections do not lead to excessive air entry to the chimney through a gap formed beneath the fire.

But where the surround is not flat or a grate projects, the use of a filling-in plate is essential if the user is to get full value from the fire. The neatest appearance will normally be obtained by fitting the fire close to the filling-in plate in the manner described for a flat surround. In some cases, however, protruding brickwork may make a free-standing installation desirable. In this method the filling-in plate is placed in the general plane of the surround and the fire stood a convenient distance forward of this plane. A flue nozzle extension should then be used, passing through an aperture cut in the filling-in plate, this aperture being of a size such that the maker's recommended flue and chimney break areas are maintained.

Failure to maintain the chimney break area at the intended figure will lead not only to reduced room efficiency but perhaps to persistent failure of the fire completely to clear its products and thus cause paint discoloration. It is suggested, therefore, that a check be made after installation for example with cigarette smoke, to ensure that products spillage is not occurring. While this is being done observation of the general smoke movement round the fire may reveal the presence of unsuspected gaps. A slit 2 ft. long by $\frac{1}{4}$ in. in width has an area of 3 sq. in. and through this area 500 cu.ft. per hr. of air may pass under the pull of an ordinary chimney.

Down Draught

Down draught and excessive chimney pull are well known troubles, Adam and Vasey point out. The latter has not normally been adequately dealt with in the past, but recently a welcome tendency has been noted to fit appropriate flue restrictions they continue. In spite of the undoubted advantages of the flue restriction, care should nevertheless be taken that the size of the restriction is not determined at a time of maximum draught, due say to wind from a particular direction, for when the wind drops so may the chimney draught and products spillage may occur.

With attention to the points of good installation noted above, it is felt that the competitive position of gas as a space heating fuel could be very materially improved.

New Under-Sea Coal Exploration Next Spring

A TOWER which the Durham Divisional Coal Board is having assembled to bore for coal under the sea is expected to be 'launched' in the spring. It will be towed to sea and moored to the sea bed; borings will then be taken for several months to examine the seams that lie further from the coast than the present underwater workings where coal is already being mined four miles out from the coast at Easington Colliery.

An official of the Board said: 'This technique will be expensive but in the long run will save development costs because it will show the exact depth at which coal is to be found.'

A second tower which has been used in boring in the Firth of Forth will be used later.

Five Years Old

Europe's first federal executive, the High Authority of the European Coal and Steel Community, has celebrated the 5th anniversary of its establishment in Luxembourg on August 10, 1952.

COMPANY NEWS

'Not Unsatisfactory' Results of Powell Duffryn Ltd.

FINAL dividend of 10% on Ordinary stock is recommended by the Directors of Powell Duffryn Ltd., for the year ended March 31, 1957. With the interim dividend this makes 16% for the year, and repeats the previous year's total distribution, with the 4¾% Preference payment, of £493,545.

In his address accompanying the annual report, the Chairman, Sir Henry Wilson Smith, K.C.B., K.B.E., said certain of the favourable features of the previous year had been much less evident in 1956-57; the pressure on profit margins resulting from constantly rising costs had been even more marked; and international difficulties, especially in the Middle East and above all in Egypt, more frustrating than ever.

Yet the Group trading surplus, after depreciation, showed an increase of £166,000, or approximately 9%. And despite the virtual disappearance from the accounts of interim income in respect of coal compensation, which had contributed £337,922 in the previous year, total net profits, after deducting the taxation provision for the year, were only £31,799 below those of a year ago.

This was not an unsatisfactory result, especially as the liquid resources of the Group were still in process of re-deployment over a wide range of diversified activities. In addition, in 1956-57, they had been able to transfer £178,000 from taxation reserve back to the profit and loss account.

'Out-of-Date Prophecies'

Concluding a review of Group developments, Sir Henry said these represented a formidable list. Apart from items not yet translated into actual commitments, the total of capital commitments at March 31 was £3,011,000. He hoped that, with a proper understanding of their current activities and forward policy, out-of-date prophecies of further return of capital would be replaced by an appreciation of the ever-growing financial needs of a virile and progressive Group of Companies.

MONSANTO HAS RECORD SALES

NET sales of Monsanto Chemicals and its U.K. subsidiaries for the first half of 1957 were £7,930,927, the highest recorded for any first six months and an increase of 14.4% over the £6,934,343 for the corresponding 1956 period. Export business rose by 24%.

Net income, before taxes, was £870,738, against £787,722. Estimated taxes are £443,200, against £404,200, leaving net income of £427,538, compared with £383,522.

Dividend

For the full year 1956 net sales were £14,034,947, net income before taxes £1,544,079 and the net balance £835,104. Figures in all cases exclude the Australian subsidiary's earnings.

An interim of 5% is declared on the Ordinary capital as doubled by cash and capitalisation issues, and although competition and increasing costs are limiting the benefits of the higher turnover, the Directors consider that the year's results should justify a total dividend of 13½%. The total for 1956 on the old capital was 22½%.

Sir Miles Thomas is Chairman.

HUDSON'S BAY CO. NEW FINANCING

SHAREHOLDERS of the Hudson's Bay Company should shortly receive rights to subscribe for shares of the capital stock of Hudson's Bay Oil and Gas Company in connection with the new financing.

About 1,745,000 additional shares of $2.50 (Canadian) each are to be offered by way of rights as to 75% to stockholders of Continental Oil Company and as to 25% to Hudson's Bay.

£250,000 Contract

A £250,000 contract has been placed with Cochranes (Middlesbro') Foundry Ltd. by the Northern Gas Board for 35 miles of 12-in. and 15-in. diameter spun iron pipes for the East Coast grid main linking the Sunderland with the Darlington Division.

N.W. WINTER COKE DATE

THE North Western Gas Board announces that winter prices for coke, which are 15s. a ton more than the summer prices now ruling, will come into force in the North West on October 1. All coke delivered on or after that date, whether ordered before or not, will be charged at the winter price.

In order to secure the benefit of the reduced summer prices householders are advised to place their orders as early as possible. If there should be a heavy rush of last-minute orders in the second half of September it is possible that the Board may not be able to guarantee delivery before the winter prices come into force.

New System

The new system of charging 10s. per ton less than the 'basic' price during the summer months and 5s. per ton more than the 'basic' price during the winter months for coke in the North West was announced in April of this year.

And Scotland Puts Up Prices

PRICES of gas coke throughout Scotland have been increased as a result of the 10% increase in railway freight charges. Ex works and delivered prices in the counties of Aberdeen and Kincardine are up by 2s. 6d. per ton, and throughout the rest of the North of Scotland by 3s. 4d. per ton. The increase elsewhere in Scotland is 1s. 8d. per ton.

Distribution Costs

In addition, the delivered prices of coke in the cities of Aberdeen, Dundee, Edinburgh and Glasgow and the counties of Dunbarton, Lanark and Renfrew have been increased by 1s. 11d. per ton on account of increased distribution costs in these areas.

New Arrester Will Help Keep Air Free from Grit

AN improved grit arrester for metal chimney stacks has recently been developed following collaboration between William Cory and Sons, Combustion Equipment and the British Coal Utilisation Research Association.

Known as the Mark 2 Cory grit arrester it has been primarily designed for installation at the top of existing chimney stacks. It has also, in a number of cases, been successfully installed in the bases of metal chimney stacks in course of erection.

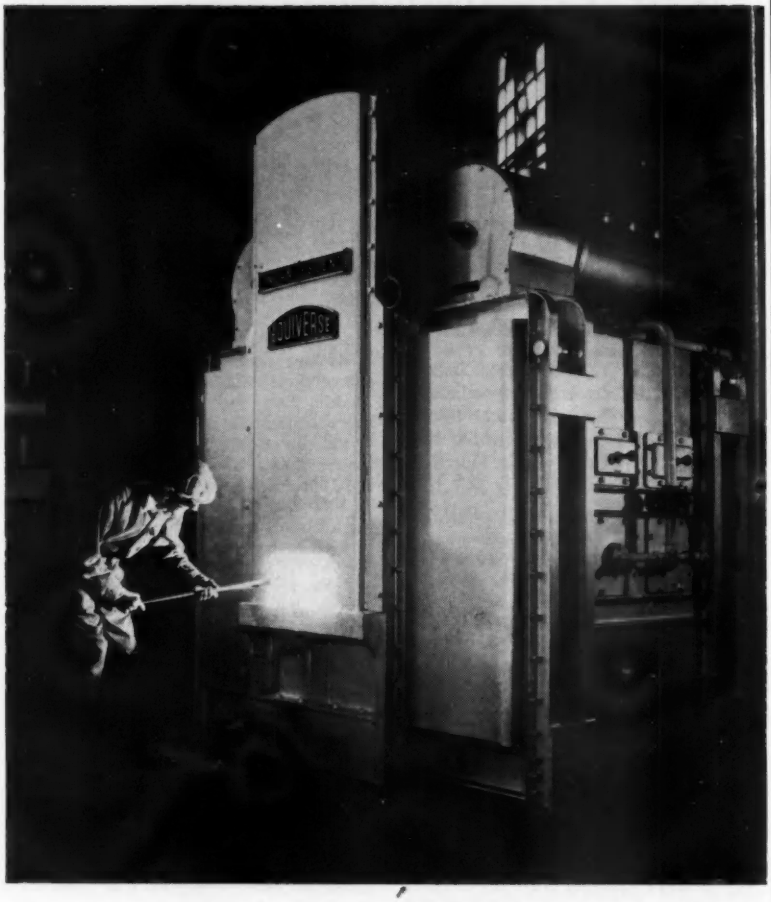
When the arrester is in operation the gases, together with their burden of grit and dust are caused to spin by the blades of a 'gas spinner.' The solid particles are flung outwards to the periphery and caught by a deflector ring at the top of the arrester. The particles then fall into a collecting chamber while the cleaned gases pass to atmosphere.

The new grit arrester is fitted with a device to enable easy clearance from ground level should the collected dust 'bridge' in the disposal pipes.

Engineering, Marine, Welding—and Nuclear Energy

Scope Widened as Exhibition Starts Second Half Century

THE opening, on August 29 and until September 12, of the Engineering, Marine, Welding and Nuclear Energy Exhibition at Olympia, marks the opening of the second half century of the series. First organised in 1906, it now occupies the three exhibition halls and galleries, equivalent to more than 250,000 sq. ft. of stand space. The scope of the exhibition this year has been enlarged to include nuclear energy, and the name, long though it was, has been further extended to make this possible. In fact, few of the 500 stands are directly concerned with atomic power, but the 'presence' of this new force in the engineering field is very much in evidence—indeed, it is probably the most potent influence since the exhibition's inception.



The revolutionary Equiverse furnace, built specially by the Incandescent Heat Company Ltd., Smethwick, for the Gas Council's stand. One of the regenerators—the 'heart' of the Equiverse system—is seen atop the furnace.

GAS PRESENT IN FORCE

This is not to imply that traditional fuels are not strongly represented and that their future is not assured. Gas, electricity, solid fuel and oil are all present in force and make their individual claims to industrialists. In the case of gas, the accent is on the elimination of scale formation in high-temperature heating processes. The demand for this in efficient production today is met by the revolutionary Equiverse system, devised by the Incandescent Heat Co., Ltd., which is shown in shown in action on the **Gas Council's** stand at the exhibition.

The Equiverse system incorporates a novel thermal cycle which can be applied to existing or new furnaces, static or continuous, large or small, and covering all heating jobs from 750°C. to over 1,300°C. Features of the system include automatic atmosphere control to maintain reducing conditions in the furnace, preheating of combustion air to ensure easy attainment of working temperatures, completion of combustion by the introduction of secondary air into the flue gases, recirculation of the flue gases to increase their velocity through the regenerators and so improve the heat transfer coefficient, and metallic elements in the regenerators with a large surface area compared with total weight afford rapid and uniform pre-heat to the combustion air when using short reversing cycles. All this adds up to high output and efficiency—and impressive scale-free performance.

EXPERTS ON HAND

During the run of the exhibition the specially built furnace on the Gas Council's stand is being operated, and experts are on hand to answer visitors' questions.

A new development in coke-fired furnaces for industrial processes is shown on another part of the stand. This exhibit is a fully automatic furnace capable of supplying clean heating gases at temperatures up to 1,250°C. The furnace is designed to operate without an attendant and incorporates automatic time-controlled coke charging and declinkering mechanisms. One of the applications of such a furnace is illustrated by a drawing showing the firing of a rotary drum drier.

DON'T MISS THESE DISPLAYS

A.P.V.-Paramount Ltd., who specialise in the supply of corrosion, heat-resisting and alloy steel castings produced by shell, CO_2 and orthodox sand moulding techniques, are exhibiting cast components in the finished and part machined condition including a three bladed 5 ft. diameter marine propeller, petroleum valve parts, chemical pump casings and impellers in a variety of stainless alloy steels.

In the nuclear energy field, of special interest will be a guide pan steel casting weighing some 800 lb. Through these pans the control rods are lowered to the reactor core thus demanding a steel casting of unusually high quality and dimensional accuracy.

The Accurate Recording Instrument Co. Ltd., designers, patentees and manufacturers of the 'accurate' range of instruments show a range of indicating, recording and controlling instruments for most pressures and tempera-

tures, from vacuum up to high pressure or from minus 240°F. to 1,000°F. Among the exhibits are dial pressure gauges; 2 in. diameter up to 12 in. in many standard types and ranges; dial thermometers; 2 in. diameter up to 12 in., distant-reading, rigid stem, vapour pressure, liquid-expansion, mercury-in-steel in ranges from minus 240°F. up to 1,000°F.

Controlling instruments, pressure switches of various types, thermostats and temperature controllers of various types. Pressure recorders of various types and ranges, as well as temperature recorders of various types in standard ranges from minus 240°F. up to 1,000°F., all with 10 in. circular charts. A multi-reading tank gauge is also exhibited.

H. Allen, Sons & Co. Ltd. feature a range of exhibits representing some of their specialised activities in the supply of power plant, pumping machinery and electrical equipment for service on board ship and on land, which comprises steam turbines, diesel engines, steam engines, gas turbines, pumps, gearing, alternators, D.C. generators, motors and control gear for marine, industrial and essential services. In addition to these this firm is a most important supplier of pass-out and condensing turbines for the gas industry.

WORKING SCALE MODEL

The largest exhibit on the stand is a 410 kW pressure-charged diesel engine-driven D.C. generator, and there is a working scale model of a steam engine-driven D.C. generator.

Pumping plant exhibits comprise a 30/28-in. vertical, double-suction, centrifugal circulating water pump for power station duty, and an 18/18-in. horizontal, double-suction pump for waterworks service. A gearing unit shown is a 2,000 h.p. double-helical planetary epicyclic gear (speed reduction 6,000 to 1,500 r.p.m.), as well as components for a 3,200 h.p. epicyclic gear for mine hoist duty.

Other electrical exhibits include a marine-type 550 kW alternator, A.C. and D.C. motors, and motor starters.

The Audley Engineering Co. Ltd. are one of the foremost firms in the manufacture of lubricated valves for the gas, petroleum and chemical industries, and employ a special method of lubrication by insertion, through specially designed channels in the plug of the valve, of sticks of lubricant of a special type to suit the particular medium flowing through the valve.

Such Audco lubricated plug valves are manufactured in a wide range of engineering and chemical engineering materials of construction in sizes up to 24 in. and designed for controlling pressures from the finest vacuum encountered in scientific work up to 5,000 lb. per sq. in.

A representative selection is exhibited including some working examples of remotely controlled power operated valves and samples of Audco valve lubricant and stem packing. The biggest item on the stand is a 2-ton carbon steel gear operated valve as installed in oil pipe lines.

Automative Products Co. Ltd. are the manufacturers of Lockheed hydraulic mechanisms, well known in the gas industry in their application to cyclic gas making plants. The centralised automatic control of carburetted water gas plants, oil gasification plants and the new processes of complete gasification depend largely on hydraulically operated remote control mechanisms made by this firm. A hydraulically operated grate motor for an automatically clinkering grate is shown. The exhibits include a typical cabinet for operation by power-hydraulic or manual hydraulic means, hydraulic cylinders in a wide range of sizes, including a cylinder capable of withstanding high operating temperatures and another suitable for working with pressurised CO_2 and a range of new semi-rotary slave cylinders. Hydraulic pumps and motors, accumulators, cut-out valves, directional control valves, selector valves, Hydroloc valve, flow control valves, pressure reducing valves, are also included. Other products include Borg & Beck single plate friction clutches, sizes 6½ in. to 18 in. dia., transmitting 38 lb./ft. to 950 lb./ft. torque, and rockford gear tooth drives, over-centre clutches and power take-offs in a range of sizes.

This firm also manufactures Purolator 'Micronic' filters and metal edge strainers. As fuel filters the 'Micronic' types, incorporating a plastic impregnated paper element, are designed for the final protection of the injection equipment on modern diesel engines, in a range of sizes from ¼ in. to 1 in. B.S.P. inlet and outlet tappings, and flow rates up to 100 gal. per hour. As dry type air filters they remove almost 100% of all abrasive dust, and can be cleaned by blowing through in the reverse direction with compressed air. They are also available as single and two-stage types for use with all types of lubricant and hydraulic fluids. A full range of metal edge strainers for the filtration of all fluids is displayed.

Lockhead-Avery hoses are shown with self sealing and replenishment couplings. The flexible hoses allow movement between units, are proof against vibration and are used for all purposes and industries where fluids are carried under pressure. There is a wide range of couplings to suit every application.

Babcock and Wilcox Ltd., manufacturers of conventional steam raising plant and equipment for nuclear energy power stations, show a number of exhibits illustrating both of these types of products.

STEAM-RAISING

Conventional steam-raising plant is represented by a number of exhibits. Among these are: oil-fired boilers, including a model of 200 MW oil-fired boiler and typical Babcock oil burners; sootblowing—the economies of proper sootblowing and the long-service features of Babcock sootblowers—cyclone-firing demonstrated by an animated film, photographs, and a model of a large cyclone-fired industrial boiler; pulverized-fuel, depicting the extensive use and service performance of type-E pulverising mills which include a sectional working model, and marine boilers—new model of Babcock selectable-superheat marine boiler, with model of a 32,000 tons d.w. tanker.

NUCLEAR POWER STATION

There are also large displays depicting a typical nuclear power station and possible future applications of nuclear power are accompanied by new, scale models of a nuclear heat-exchanger and a reactor pressure vessel.

Nuclear ship propulsion is envisaged by a model hull section showing a projected layout of nuclear power plant.

British Arca Regulators Ltd. are manufacturers of automatic control equipment which is of special interest to the gas industry. Such applications include draught and gas pressure regulators and retort house governors. Among the exhibits to be found on the stand are automatic control equipment comprising thermostatic, pressure humidity and liquid level controllers together with servo operated valves.

The British Ermeto Corporation Ltd. is showing a full range of its couplings and high pressure valves.

This pipe coupling is patented throughout the world and capable of withstanding the highest industrial pressures even under conditions of extreme vibration. It is widely used on hydraulic brakes and presses, hydraulically operated machines of all kinds, also airplane control systems, diesel and internal combustion engines, etc., etc. It is manufactured in a wide range of fittings for steel, stainless steel, aluminium and brass tubes.

The British LaBour Pump Co. Ltd. are exhibiting a range of typical pumps manufactured in a wide variety of acid resisting alloys including self priming glandless units, horizontal self priming and flooded suction pumps. The new USL self priming mining pump is also shown. The exhibit includes sectionalised pumps of all types illustrating the principal internal features of the pumping units.

These pumps have been used with success on gasworks for pumping tar and liquor.

British Rototherm Co. Ltd. show on their stand a range of dial thermometers, recorders and controllers. These include bi-metal indicating thermometers in dial diameters from 1 in. to 7 in. in maximum/minimum and control/alarm types, specially designed for marine, chemical, laboratory and most industrial applications, including a special design for fitting to diesel engine exhausts with an anti-vibrational devise.

Mercury-in-steel indicating thermometers in dial diameters from 4 in. to 10 in. including the rigid stem and distant reading models, maximum/minimum, control/alarm, and many special industrial designs are also on show.

Vapour pressure indicating thermometers, temperature, pressure, vacuum

and compound recorders for wall and panel mounting, and portable and process batch temperature recorders are to be found on the stand.

British Thomson Houston Co. Ltd. occupy the leading position in the marine gas turbine field which is demonstrated by some of the main parts of the actual 1,200 h.p. gas turbine recently removed from the Shell tanker 'Auris,' after 20,000 hours of running on load.

Also shown is a model of the new B.T.H. 5,500 h.p. gas turbine and geared drive as it will be installed in the 'Auris' to replace the B.T.H. gas turbo-alternator set and the three diesel alternators which formed the original propelling machinery.

Other exhibits show turbo-electric and diesel-electric ship propulsion equipment, including a reference to the 90,000 s.h.p. turbo-electric equipment for the new liner, Harland & Wolff, being built for the P. & O. Co.

ELECTRONIC EQUIPMENT

Electrical equipment for industrial applications on show includes a model of one of the 66,667 kVA waterwheel driven alternators for Eildon, Australia; germanium rectifiers; voltage regulators; motors; and electronic equipment.

Another exhibit features some of the important equipment B.T.H. is supplying for the C.E.A. nuclear power station at Berkeley.

Broom and Wade Ltd. show a number of rotary portable air compressors representative of the WR range, together with stationary reciprocating double acting single stage compressors of the SS range of the portable compressors. There are three sizes on the stand, each capable of delivering 120, 250 and 600 cu.ft. of free air per minute at 100 lb. per sq. in. Each are powered by diesel engine, the smaller models by Ford 38 and 42 B.H.P. power units and the largest by a Rolls Royce 180 B.H.P. engine. The smaller units suitable to the gas industry's distribution departments are mounted on a two wheeled chassis and enclosed in a body of attractive lines. These two models weigh about 1.4 and 2.1 tons respectively.

Other exhibits include high torque pneumatic drilling and ramming machines, type M.V60, and an evaporative cooler, incorporating a high efficiency after cooler, type 20, for use with compressor units.

Cathodic Corrosion Control Ltd. The exhibit on this stand demonstrates the scope of the revolutionary CX3 alloy anodes in cathodic protection schemes against corrosion by sea and estuarine water. Details of method of protecting jetties, piers, ships hulls and stern gear and the inside walls of sea water carrying pipelines are shown. A range of standard anodes is available for inspection and a modified type of transformer rectifier is shown for the first time.

The Comet Pump and Engineering Co. Ltd. Among the Comet exhibits is shown a range of horizontally and vertically mounted fuel oil sludge and supply pumps, cargo pumps and a working model illustrating the Comet's genuine 29½ in. vacuum. Industrial exhibits include handling 'unpumpable grease,' extruding heavy material through small nozzles to illustrate the Comet Liquorice Triumph and a dual drive, high torque unit. A working demonstration shows the Comet's ability to handle all manner of rubbish, rag, cotton waste, bottle tops, pieces of wood, etc.

On the **Crane Ltd.** stand valves for medium high pressures and temperatures are the principal exhibit. Cast steel valves for up to 600 lb. pressure and up to 1,200°F. with a variety of trims, including bronze, nickel alloy, Exelloy, hardened stainless steel and molybdenum alloy, bronze valves for 300 lb. steam working pressures and cast iron valves for water working pressures up to 200 lb. are all shown.

Malleable iron pipe fittings and unions up to 300 lb. steam working pressure and steam traps are also representative exhibits of the company's manufactures.

Davey, Paxman & Co. Ltd., in collaboration with their associates, Ruston & Hornsby Ltd., are exhibiting on the combined Ruston-Paxman stand four engines chosen from their 7 in. to 9¼ in. bore series, covering a power range of 100 to 2,000 b.h.p., and the equipment fitted to each emphasises the adaptability of Paxman engines.

Two normally aspirated engines from the 1 in. bore range are shown, a four cylinder and an eight cylinder. The former is fitted with a Metropolitan-Vickers alternator designed to produce 80 kW at 440 volts at a constant speed of 1,000 r.p.m. The engine, radiator and alternator are mounted on a common steel fabricated base thus rendering it a compact and portable set.

The eight cylinder engine with Brockhouse torque converter takes the form of a Paxman Drilpak standard oilwell drilling set.

One 16 cylinder pressure charged 7 in bore engine is shown; this is designed to give 1,000 b.h.p. at 1,250 r.p.m. Two pressure chargers are fitted, one to each bank of cylinders. The combined sump and underbase is of fabricated steel construction.

Finally, the largest engine and the only 9¼ in. bore on view is the 1,575 b.h.p. 12YLCM engine designed to run at a 1,000 r.p.m. This engine is both intercooled and pressure charged, and with these modifications produces a maximum h.p. of some 60% higher than the normally aspirated engine.

Features worth some thought concerning Paxman engines are 70% interchangeability of wearing parts throughout the 7 in. bore range. A wide power range of 100 to 1,000 b.h.p. is available from one cylinder size, number of cylinders throughout the 7 in. range being 4, 6, 8, 12 and 16. The vee-formation gives a small engine in comparison to its power output, and also makes itself readily accessible for maintenance.

Sml. Denison & Son Ltd. show testing machines and weighing machines, including the latest 50 ton multi-capacity universal 200 ton compression, 5 ton tensile, 15,000 lb. universal, and ¼ ton high-temperature creep testing machine, and suspended weighing machine for use on crane hook, a wide range of accessories for use with the testing machines are displayed, and demonstrations are given.

The Department of Scientific and Industrial Research. On this stand are represented five sections of the D.S.I.R.'s activities, namely, those dealing with testing and research in industry. There are interesting views of the mechanical engineering research laboratory, and exhibits of apparatus used in the exceedingly accurate measurement of the size and shape of such things as screw threads and the teeth of gear wheels. Poster illustrations show how the performance of machines can be influenced by poor design and how the wear on gears and screw threads can be eliminated or at any rate reduced to a minimum by careful attention to the original design. A.M.E.R.L. air content apparatus for measuring the content of air in liquids, which has been built as the result of research in this laboratory, is on view.

The **Dunlop Rubber Co. Ltd.** are showing two working models of the Dunlop disc brake as used in aircraft and road vehicles and now being developed for industrial and marine applications.

Models and photographs of typical installations now being undertaken are exhibited for the first time.

One shows the brake as applied to a rubber mill driven by a 60 H.P. electric motor. On applying the brake, this machine will stop within 6 in. of roll travel. The second example is of a larger capacity mill, driven by a 250 H.P. motor in which a combined clutch disc of 43¼ in. diameter and brake 39¼ in. diameter are installed between the motor and the reduction gears.

Examples of components made from the new synthetic material Duthane are shown.

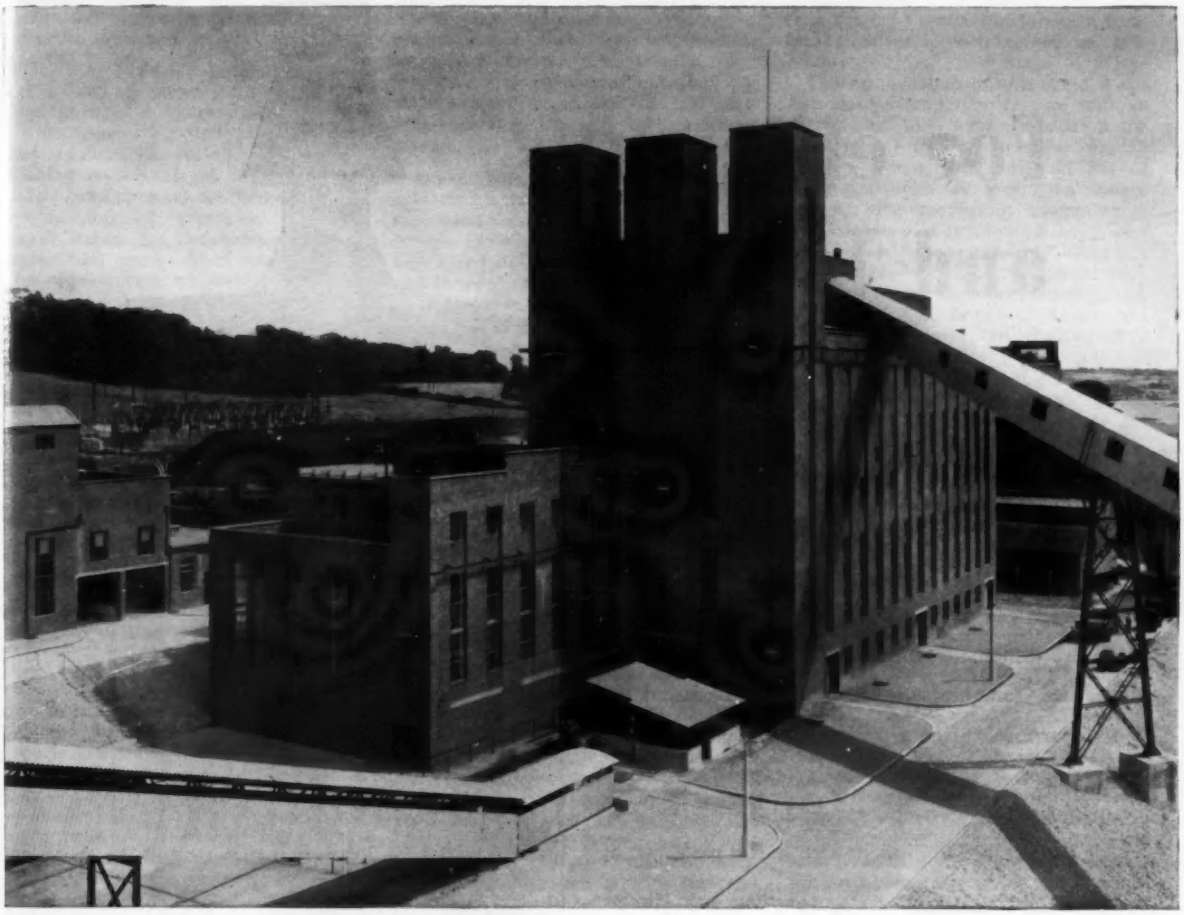
Standard ranges of rubber products including power transmission couplings, anti-vibration mountings and rubber springs are also shown, together with examples of precision components made to customers' requirements.

HEAT-RESISTING

Conveyor and elevator belting of all grades and types suitable for mining, quarrying, chemical, cement, gas, electrical, iron and steel and food industries —with special emphasis on heat resisting qualities. The new Maxrate vee belt suitable for operating to premium horse power ratings, and flat transmission belting for agricultural and all other industries are all shown on this stand, together with samples of hose for a variety of purposes.

Fibreglass Ltd. show on this stand the many and varied uses of this material in the marine field—not the least of which is Fibreglass reinforced plastics for lifeboats, dinghies, etc.

Fibreglass is used on board ship for insulation piping, and ducting; passenger and crew accommodation, domestic cold



The Intermittent Vertical Chamber house and waste heat boiler annexe at the New Kingston Works, Isle of Wight, of the Southern Gas Board.
30 - 3½ton chambers with a daily gasmaking capacity of 3.8 million cubic feet of 475 B. Th. U. gas after producer gas dilution.

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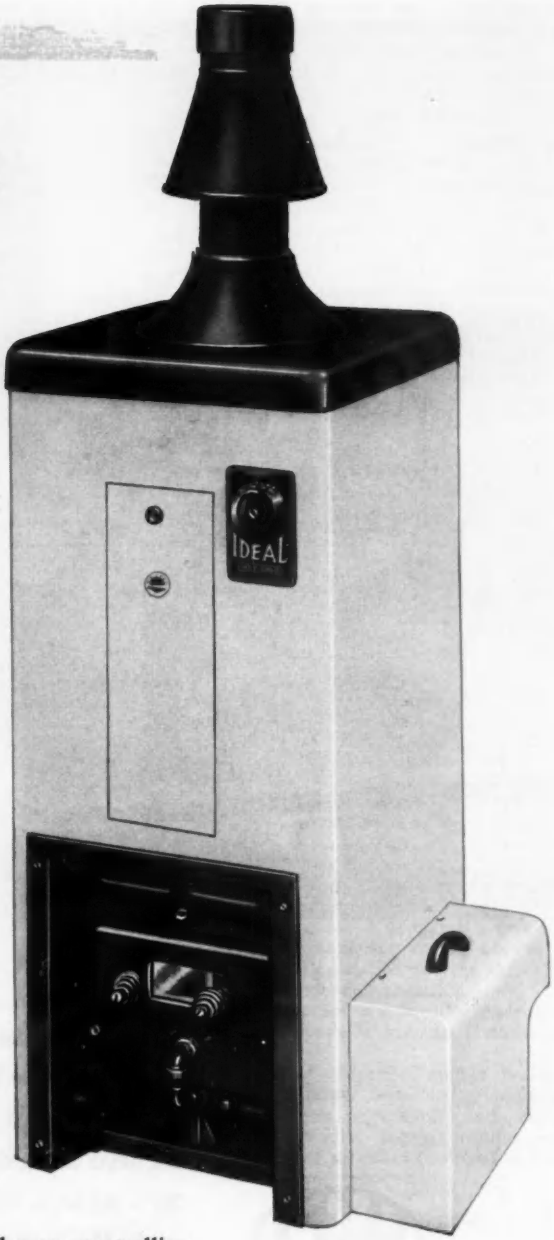

To burn gas efficiently for the production of hot water, either for domestic purposes or central heating, demands a Boiler specially designed for the purpose. Over a period of 20 years we have developed a series of Boilers, each of which is unequalled in its particular field.

All Boilers are equipped with a complete set of thermostatic controls, and have insulated jackets of enamelled steel or aluminium in appropriate finishes. 'Ideal' Gas Boilers, of which several thousands a year are being installed, are available in 22 sizes from 20,000 to 1,430,000 B.T.U. per hour. *An illustrated booklet giving full details is available on request.*

In the current models of the No. 1-GBC series, the gas controlling instruments are protected by a neat removable stove enamelled cover.

IDEAL GAS BOILERS

RELIABLE AND LABOUR-SAVING

IDEAL-Standard

Foremost for heating and sanitary equipment

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chambers; bulkheads and engine-room casings and ashore in the domestic field for house insulation.

On the **Fluidrive Engineering Co. Ltd.'s** stand are shown the new Fluidrive developments in power station plant, marine engineering and general industrial applications, including static and working models of the main types of Vulcan-Sinclair fluid couplings covering a wide range of horsepower. Nuclear power station gas circulators and large boiler feed pump drive speed regulation requirements are met by the DST range of couplings and an exhibit of 3,000 H.P. at 3,000 r.p.m. is included. Other exhibits include S.S.S. clutches for marine propulsion and nuclear projects and the latest traction type fluid couplings for diesel and electric motor applications.

The **Harris Engineering Co. Ltd.** are showing among their gas-fired equipment gas unit heaters, both indirect and direct types, together with infra-red radiant heaters for horizontal suspension at any height or for wall mounting. Another gas product is the Wellsway Mark 2 flued gas convector heater which has an output of 30,000 B.Th.U. per hour.

A range of oil-fired equipment is shown and includes unit heaters which can be used free standing or connected to duct work. Vertical or horizontal models are available.

The Trion equipment exhibited consists of cased electronic air filters and a demonstration model of a typical automatic water washing system. These filters are designed to give up to 95% efficiency (photometric basis), equivalent to approximately 99.9% on a weight basis.

G. A. Harvey & Co. (London) Ltd., which specialises in the fabrication of steel vessels for the chemical and oil industries, is developing automatic welding techniques to improve the quality of high pressure vessels. Large testing facilities are being developed too, to be used in the research work on aeroplane engines which involves the testing of metals at high and extremely low temperatures.

These and other developments are being shown by photographs on the stand. Examples of the firm's products being exhibited include heat exchangers, pressure vessels, sheet metal and steel platework, perforated metals for industrial and decorative purposes, woven wire gauze and wirework, flanges, stillages, gilled tubes and heavy gutters. Furniture for the drawing office is featured by the new draughting desk and a plan cabinet.

On the **Hilmor Ltd.** stand is to be found a comprehensive range of hand operated, hydraulic and motorised tube bending machinery. Special prominence is given to the mandrel type machines designed to produce completely full bore bends on extra short radii, cold and unfilled, which are widely used in the production of tubular furniture, exhaust pipes, cycle handlebars, transformer bends, aircraft components, chemical plant, steam and shipyard installations, etc. Several new machines, including a semi-automatic power operated bender, are shown for the first time at this exhibition and experienced operators are in attendance to demonstrate and give expert advice on all tube bending matters.

James Howden & Co., Ltd., are exhibiting a number of their products on this stand, which include an induced draught fan wheel and shaft, an auxiliary high speed steam engine and marine fan and Howden rotary compressors. Models of the Howden rotary regenerative air preheater, the Howden package air preheater are also on view together with models of 'TV' and exhauster fan impellers and an 'Instanter' quick-closing sluice valve.

Imperial Chemical Industries Ltd., Metals Division, are showing a large variety of non-ferrous metals, together with Integron integral steel heat exchanger tubing. The exhibits include wrought metals for nuclear reactors; extended surface tubing in magnesium alloy; zirconium, niobium; non-ferrous and bi-metal tubes and plates for condensers, coolers and heat exchangers in land, marine and nuclear power station plant, and oil and sugar refinery plant. 'Kunifer' 30 and 30A, 'Alumbro,' 'Resisco,' Admiralty and 70/30 brass, titanium and titanium alloy strip, sheet, tubes, wire, rod, section, bar, billet, slab and forging stock. 'Kynal' aluminium alloy extrusions, sheet and plate for road, rail, sea and air transport and 'Kynal' profiled sheet for roof and wall cladding. Heavy and medium metal presswork, and refrigerator, automotive and instrumentation small diameter copper tubing in long-length soft temper coils.

I.C.I. copper and aluminium 'Tube-in-Strip' and welding and brazing rods and wires are also shown.

International-Carl Still Ltd. combines the resources of Firma Carl Still in Germany and the International Combustion Co. Ltd. in England in the manufacture of modern coke ovens embodying the Still patents and by-product plant for gas scrubbing and benzole extraction.

COAL AND COKE CHARGING

The coke oven model shown with accompanying displays is representative of the equipment supplied up to the 6 metre oven with its proved high efficiency and saving in pusher and coal and coke charging equipment.

By-product plant exhibits include a model of a gas scrubbing unit. This model illustrates an entirely new conception of scrubber vessel filling material by which it is claimed that the extra efficiency in operation makes it possible to reduce the dimensions of the tower. Equipment is offered for tar dehydration; benzole, ammonia and hydrogen sulphide scrubbing; gas cooling and processes for the wet desulphurisation of coke oven gas and for the removal of sulphur from benzole by the hydrofining process. The firm is also experimenting with hot coke car design.

International Combustion Ltd. and International Combustion Products, Ltd., are exhibiting a great variety of their products.

The main feature on this stand is the section of a watertube furnace wall incorporating the latest furnace casing techniques. Supporting this display there is a new scale model of one of the boiler units for Willington Power Station. The combustion equipment of the company is represented by a new scale model of a type 'L' travelling grate stoker and scale models of both tilting corner burners for pulverised fuel firing and for oil firing. A section of a Lopulco mill shows the latest development in the design of a triple roll mill for the preparation of pulverised fuel. Other products being shown include a Dynocone continuous centrifuge for continuous dewatering in collieries, chemical and allied industries, a working Vacseal pump requiring no sealing water and incorporating an auto-priming device, and the Agitair flotation machine for use as a cleaner, a rougher, or a scavenger in both metallic and non-metallic flotation circuits. This machine is new to the British market.

Laboratory equipment including a new Rovac filter, a new sample reducer, mills, separators, sample splitters, sieve shakers, testers and elutriators is also being shown.

Richard Klinger Ltd. are showing a large selection of their jointing material which is made in a number of special grades for special application depending on the material being carried. Here are seen jointings both in compressed reinforced asbestos sheets and in precision cut gaskets. Gaskets are also being exhibited made from special materials such as synthetic rubber mouldings, extrusions from silicone rubber and Klinger flou or polytetranfluoro ethylene. The chief exhibit is a working model of four Klingermatic valves which can be operated by remote control. Of these valves, the 1 in. and 3 in. valves are push button operated by electrical means and the 2 in. and 4 in. valves are hydraulically operated after manual selection on the remote control panel. Other exhibits on this stand include the R.T.A. level gauge, which is suitable for mounting on boilers and can withstand a pressure up to 2,000 lb. per sq. in.

Major, Robinson & Co. Ltd. are exhibiting a wide range of 'Scols' tube and bar bending machines and 'Scols' super iron cements, compounds. Tube bending machines for use by hand, hydraulic or electric power are shown. They range from a capacity of ¼ in. to 6 in. diameter, bend cold without loading, and are suitable for dealing with gas, steam or conduit tubing. Machines are also shown for dealing with light gauge copper tubing up to 2 in. diameter.

In addition, a range of the latest Scols hand lever cropping and shearing machines for round, angle, square, 'T' or flat bars, together with the very latest Scols lever bending machine for bending rods, flats, are to be seen on this stand.

Murex Welding Processes Ltd., are showing a number of new products of great interest. These include new welding electrodes, a new automatic welding machine, new welding transformers and new welding accessories. Of the new electrodes, the 'Fastex 100,' which has been developed for rapid welding of pipe joints in situ is of the greatest interest to the gas industry. By using the 'stove pipe' welding technique an extremely fast deposition rate is possible. Other new electrodes are the 'Fortrex 35A' and the 'Suprex' range. The new automatic equipment shown is the new 'Muramatic' automatic arc welding machine which can be supplied as a separate unit or can be mounted on a self-propelled carriage. The new Murex 210 transformer is being shown. It is ideal for small engineering shops, garages or agricultural workshops. A new engine driven equipment shown on the stand is the Murex 'Overlander,' 300/400 amp., powered by diesel engine. Other equipment on view includes a new Murex stationary 300/400 amp. generator powered by an Armstrong Siddeley 3-cylinder air cooled engine, and a number of new accessories of which helmets with a locked 'up' device and special lightweight leather jackets are of the greatest interest.

Ransomes, Sims & Jefferies Ltd. are showing the following forklift trucks and other similar equipment. The FL.10 battery powered forklift truck on solid tyres has an 8 ft. lift and a capacity of 1,200 lb., fitted with Hydrum load clamp. A FL.2000 battery powered forklift truck on solid tyres has a 12 ft. lift, a capacity of 2,000 lb., and fitted with side shift. A third, the FL.3000, is a battery powered forklift truck on cushion tyres. It has a 10 ft. lift, a capacity of 3,000 lb. The largest of this type, the FL.4500, battery powered forklift truck on cushion tyres, has a capacity of 4,500 lb., and is fitted with high free-lift.

Other equipment shown is a T4 battery powered tractor fitted with cab, hauling capacity 10 tons, on pneumatic tyres, and an ENU8 battery powered elevating platform truck, capacity 2 tons, on solid tyres.

The Rawlplug Co. Ltd. are showing typical examples of their products. These include Rawlplugs for making firm screw fixings in any materials. Metal plugs are also made for specific fixings.

Rawlbolts (metal expansion bolts) are heavy duty where no grouting is needed. Two types for walls and floors in all sizes from $\frac{3}{16}$ in. to 1 in. diameter are on view.

Other types of Rawlplug heavy duty bolt fixings for specific purposes are bolt anchors, cement-in-sockets and Rawltamps, the latter being made specially for shallow concrete.

High efficiency tools for making clean round holes in all kinds of masonry and tiles and various types for hand, mechanical, electric and pneumatic operation are shown.

Durium drills, carbide tipped drills, for rotary and percussion operation, silent, fast cutting drills with the deep undercut flute to prevent clogging and packing, are also to be seen on this stand.

Reavell & Co. Ltd. are exhibiting a representative selection of their compressors and exhausters for air and gases, including a vertical double-acting two-stage compressor of 1,500 cu.ft. per minute capacity for pressures up to 120 lb. per sq. in. Three sizes of single-acting two-stage compressors of 400, 300 and 200 cu.ft. per minute capacity for 100 lb. per sq. in., and three single-stage machines of smaller capacity for the same pressure, are being shown, and there are also examples of two-stage marine type compressors for 450, 600 and 1,000 lb. per sq. in., a three-stage compressor for 2,500 lb. per sq. in., a four-stage machine for 3,500 lb., and an oxygen compressor of the wet cylinder type for 2,250 lb. per sq. in. On this stand also are three types of rotary compressors and two types of rotary air engines for starting internal combustion engines.

Riley (I. C.) Products Ltd. are showing a selection of stoking equipment including automatic stokers, a comprehensive range of which are shown with machines of the underfeed type for capacities from 12 lb. to 1,200 lb. of coal per hour, a Riley Type T chain grate stoker for horizontal shell type boilers and a display of the Riley Trickle Feed Kiln Stoker.

Oil burner equipment on show includes burners for 220 secs. fuel oil, distillate fuel oils and the 'HL' variable load, high-low-off type. A working oil fired air heater unit, shown for the first time, incorporates a separate Riley refractory lined combustion chamber. Other equipment on show is a Syntron electric vibratory equipment, the units working of which embrace bowl feeders, heavy duty feeders, etc.

Rozalex Ltd. are exhibiting the full range of their protective barrier creams and skin conditioning ointments for protecting the skin and safeguarding against occupational skin diseases and to keep the hands in a clean and healthy condition. The restyled Rozalex dispenser is also on show, which is specially designed for issuing a controlled and uncontaminated supply of Rozalex when and wherever required. New barrier creams are featured, which are developments from the continuous research and investigations by this Company, each designed to combat specific hazards which have, hitherto, presented problems. Of these, Rozalex barrier creams Nos. 9 and 12 are of special interest, No. 9 being designed to protect against synthetic resins and glues, while No. 12 safeguards the skin against the damaging effects of ultra violet light from arc welding.

The **Saunders Valve Co. Ltd.** In addition to the well established range of manually operated valves, the Saunders exhibit gives prominence to a variety of power operated diaphragm valves, both pressure and electrically controlled. Type 'A' valves are shown in a variety of body materials, including plastics. There is also the 'K' straight through design operated both by handwheel and remote control. The type 'M' spherical plug valve is also on view. The Safran Pump division of the company shows units indicative of the robust, compact construction of the centrifugal pumps with which the company has long been associated.

Senior Economisers Ltd. are making a special feature of the marine economiser and are displaying a large section of an actual marine economiser as built for installation in a tanker. A working model of the traversing type sootblower is also being displayed giving a clear picture of the steam jets directed through the straight gas passages which is one of the main features of the design of this economiser. Smaller models to illustrate other types of economisers are shown, all of which make use of the 'H' pattern element providing straight gas passages throughout. Sample welds and sectional models showing gland assembly of the gas seal at the ends of the marine economiser are on view.

Siebe Gorman & Co. Ltd. have divided their stand under four headings—Marine, Nuclear Energy, Industry and Diving.

In the Marine section, the main exhibit is the new 'VISTA' mask, which is approved by the Ministry of Transport for use in ships. 'VISTA' masks are available for personal tests under all conditions for which it is approved. In this section, too, is the marine compressed air breathing apparatus as supplied to all the leading British shipping lines. In the Nuclear section are clothing and similar protective devices including respiratory apparatus and the company's new pressure suit. Chrome leather garments and reflective heat clothing used in certain of the atomic energy establishments are also shown. In the Industry section is the full range of dust masks, breathing and resuscitation apparatus and protective clothing for chemical workers, and the Diving section is dominated by a glass windowed diving tank in which underwater demonstrations, using standard diving dress and the 'Essgee' aqualung takes place each day. Diving accessories—pumps—telephones, underwater lamps, cutting and welding outfits are also demonstrated.

Spanner Boilers Ltd., are exhibiting a large all-welded vertical marine composite boiler fitted with exhaust heated superheater. The exhaust gas section is designed to take all the gas from a 13,000 b.h.p. supercharged marine diesel engine with the oil-fired section automatically fired with a heavy oil burner. Total output of the boiler 14,500 lb. of steam per hour at 215 lb. per sq. in. gauge. 9,000 lb. from the exhaust gas section and 5,500 lb. from the oil-fired section. The superheater is designed to give 90°F. of superheat. A full range of Swirlyflo tubes and a Spanner S.G. long distance water level gauge are also being exhibited. A comprehensive selection of drawings and photographs of direct fired and exhaust gas boilers is available for inspection.

Spencer-Bonecourt-Clarkson Ltd. are

showing their 'steambloc' fully automatic-oil-fired boiler with displays indicating its wide application in many industries. Other exhibits include a Clarkson Bato 100 packaged hot water boiler and scale models of a Clarkson waste heat boiler and a Clarkson thimble tube boiler.

The **Stanton Iron Works Co. Ltd.** are showing on their stand spun iron pipes 2 in. to 27 in. in diameter, of which they are the largest manufacturers in Europe, the flanged spun iron pipe which combines the advantages of lighter weight, high tensile strength and specially designed cast iron flanges, and spun concrete pipes in diameters from 9 in. to 78 in. Prestressed concrete pipes above 27 in. in diameter, which have only been recently manufactured in England, and are in demand for water schemes, are also on show. The use of Stanton flanged spun iron pipes for marine installations is illustrated by means of an oil tanker model.

Stewarts & Lloyds Ltd.—On this stand is to be seen a large selection of manipulated pipework for a wide range of pressures and temperatures, such as boiler tubes, seamless and electric resistance welded; ship and shipyard equipment, including sheer legs, tubular steel derricks, davits and masts; steel butt-welding fittings, coils and steel castings. There is a wide range of joints and couplings, including Victaulic joints and Viking Johnson couplings, and protective linings and coverings, including glass tissue wrapping, together with brass and gunmetal valves and fittings.

Tangyes Ltd. are exhibiting typical products from each of their five divisions: Pumps, Hydraulics, Engines and Foundry Attention is specially drawn to some of the products of recent design, which include the R.E.S. Process Pump, designed and manufactured to the strict specification demanded by the refinery and petro-chemical industries, and proving of value in other fields, and a close-coupled pump providing an extension to the range of A.R. pumps now available in four sizes (1½ in. to 3 in.).

Teddington Industrial Equipment Ltd. have on show a selection of automatic control equipment for temperature, pressure humidity and liquid level speed. These include thermostats, pressure controls, humidistats, motorised valves, modulating controls and sequence controllers. Furnace pressure regulators, control equipment and panels for oil-fired boilers, strain gauges and pilot flame safety devices are also to be seen on this stand.

They are also showing automatic protection equipment for diesel engines and compressors. This includes protection panels, shut down solenoids and mechanical shut down devices.

Tufnol Ltd.—Tufnol for pipeline equipment, for ships' bearings, and for general engineering uses—these are some of the ways in which Tufnol is exhibited to demonstrate its many advantages. Pipeline engineers can see how Tufnol gaskets, washers and bolt-jackets, bearing pads and shroud boxes are used to counteract electrolytic action.

Edgar Vaughan & Co. Ltd. feature a comprehensive range of metal cutting oils, grinding fluids, drawing compounds, broaching oils and also super cutting oils for modern heat-resisting steels. On this stand will also be seen special machine tool lubricants, and hydraulic oils including 'Houghto-Safe,' the fire resistant hydraulic fluid, and rust preventives.

Industrial cleaners, for hot and cold application in pressure washers and still tanks, are also of interest, so is Houghto-Solv, a quick-acting fuel oil additive for marine and industrial use and as a tank cleaning solvent for oil-burning, diesel and oil-carrying ships.

Thos. W. Ward Ltd. are exhibiting examples of the new and extensive Ficep range of shearing machines, for which they are sole distributors in the U.K., including a model CGC size 80 billet shearing machine, and two examples of the model 'Standard' universal combination punching and shearing machines. A range of hand lever operated punching and shearing machines, including model 558K/11 which will perform all functions of a power operated machine, are also to be seen on this stand, together with a model CCL size 600 alligator shearing machine and a model 'Beton' portable bar shearing machine size B32 with foot controlled clutch, single or continuous stroking and adjustable blade opening.

G. and J. Weir Ltd.—One of the principal exhibits on this stand is an evaporator with the new 'Thermoflex' heating element in block form with corrugated or fluted sides.

Additional features of interest on this stand are an 8 in. by 7 in. compressor; a steam turbine for driving pumps, fans and other machinery; a direct-acting pump and a 'Robot' regulator in section. A working model of the Weir closed feed system demonstrating its operation with 100% de-aeration at all loads is also to be seen on the stand.

Zwicky Ltd. are demonstrating an entirely new addition to the range of products on their stand. This is a self-cleaning air filter of the metal edge type with a degree of filtration down to .003 in. Also to be seen on this stand are constant pressure and pressure regulating valves especially designed for the oil burning industry and capable of being used with most other liquids. The 2 in. by 2½ in. high pressure hand pump for boiler lighting-up purposes and the 4 in. by 4 in. portable hand pump which may be used for fire-fighting or transfer of liquids. The familiar Zwicky hand pump has been re-designed and a sample from the range being displayed.

WELDING EXHIBITION

In the Welding Exhibition there were a number of firms giving practical demonstrations with full scale equipment.

British Oxygen Gases Ltd. demonstrate on this stand the latest developments in gas welding and cutting equipment and processes including inert gas welding. A complete range of versatile 'Saffire' equipment is shown which can be used for gas welding, cutting, gouging, heating, flame cleaning, rivet washing and several other specialised tasks. The 'Saffire Universal' hand-cutting blowpipes are capable of cutting mild steel up to 12 in. thick. The 'Bison' oxygen profile cutting machine is seen in operation, and is capable of making profile cuts up to 12 in. thick and may be fitted with three cutters. The smaller 'Beagle' transportable profile cutting machine and the lightweight 'Bantam' straight line cutter are also demonstrated, while the latest Argonarc and Argonaut equipment demonstrate the use of inert gas processes.

Lincoln Electric Ltd. are showing a variety of equipment which includes Lincolnweld fully automatic welding equipment, manual Lincolnweld, two SAE 900 motor generators. Among other motor generators on the stand, a manipulator and vacuum plant, a SAE 300 diesel welder, and welder's accessories, which includes electrodes, a welding booth and an 'Arcair' torch, are also to be seen.

Metropolitan-Vickers Electrical Co. Ltd.—On this stand can be seen a Metropolitan-Vickers type A.S.125 spot welding machine—air operated, 125 kVA, a Metropolitan-Vickers type HRP22 rope parting machine for parting and sealing wire ropes, a Metropolitan-Vickers automatic submerged arc welding machine for longitudinal welds, and a model of a Metropolitan-Vickers welding manipulator—25 ton capacity, electrically operated.

Murex Welding Processes Ltd., are showing a comprehensive range of Murex arc welding equipment, accessories and electrodes. The exhibits include a new automatic welding equipment, petrol and diesel engine-driven welding sets, motor generators for operation on A.C. or D.C. and welding transformers. Murex electrodes for the arc welding of all classes of steel and non-ferrous metals and for hard facing applications are shown. A new pipe welding electrode and 'Coilex' continuous electrode for automatic arc welding are also to be seen on this stand, and a full range of Murex welding accessories, examples of welded fabrication, technical publications, and practical demonstrations of arc welding complete the exhibit.

Solus Schall Ltd.—On this stand is being shown equipment for non-destructive testing by X-rays, gamma rays, ultrasonic eddy currents and fluorescent or magnetic penetrants. In addition there are some instruments for electronic micro metrology. The X-ray apparatus are self-contained complete units for 120 kV, 200 kV, 260 kV and 300 kV. Protected tube shields are shown for long unipolar 150 kV hollow anode X-ray tubes and for bipolar tubes working at 300 kV or 400 kV. Gamma ray apparatus are containers lined with tungsten alloy or lead for radio-active isotopes.

Report on the Position of Natural Gas in the European Economy

PREPARED BY THE SECRETARIAT OF THE ECONOMIC COMMISSION FOR EUROPE OF THE UNITED NATIONS ORGANISATION

THE purpose of this report is to outline the natural gas situation in Europe and, bearing in mind that this particularly interesting source of energy has only recently begun to be exploited and is at present the subject of intensive investigation, to bring out the initial conclusions which can already be drawn from the experience acquired in certain countries. The technical qualities of natural gas, its high calorific value—which makes it possible to transport large quantities of calories in a relatively small volume—and its flexibility in use place it in a favoured position in the field of power economy as a whole. It is all the more desirable, therefore, that natural gas should be used as efficiently and effectively as possible in all countries.

So far, natural gas has been used either for thermal purposes proper, or as a raw material in the chemical industry, or for the production of electric current, or for vehicle traction. It has been used both by itself and mixed with other gases and air. It has been distributed both direct (to some users) and through public distribution services. Lastly, it has been exploited both on a relatively narrow, regional basis, and, through long distance transport networks, on a national scale, while it now seems that prospects are developing at the international level. The matter is thus exceedingly complex, and it would be most dangerous to generalise without taking the economic and power-supply situation of each country into consideration.

Small Proportion

There is no doubt, however, that in a field that is so new, relatively speaking, some countries have more experience than others. This is particularly true of the United States, to some extent of the U.S.S.R., and since the war of Italy, Poland and Roumania. Accordingly, without neglecting other countries, the present report was bound to stress more particularly the achievements of the most advanced countries, to explain the nature of the problems, to show the solutions adopted and, finally, to compare those solutions with those contemplated in countries where the development of natural gas is only in the early stages.

Except in a few European countries such as Roumania and, to some extent, Italy, natural gas as yet accounts for only a relatively small proportion of the total power supplies if quantity alone is considered. Its economic rôle is, however, much more important than appears at first sight, partly because of its high utilisation efficiencies and partly because, owing to its geographical location, it may promote the development, through the introduction of new and important industries, of areas which have hitherto remained relatively under-developed owing to their remoteness from sources of energy.

Italy and Roumania are the two European countries in which, in the post-war period, natural gas exploitation has been most substantially developed; they are also the two countries in which the position occupied by methane in the general power economy is at present the most important. Natural gas, a negligible factor in Italy before the War, accounts for 8.9% of the country's energy consumption in 1955 on the basis of calorific equivalence, of 11.5% if account is taken of utilisation efficiencies. The importance of this will be fully appreciated when it is considered that the traditional shortage of energy has always been a serious handicap to the Italian economy, and that the development of Italian natural gas resources has come at a particularly opportune moment, namely, the post-war reconstruction of Italian economy.

Italy's need to import the greater part of its power requirements has often led to a shortage of power and has always resulted in the cost of energy in Italy being above the prevailing level in competing countries. While this situation has been slightly improved by the use of liquid fuels, of which, even though likewise imported, the cost per calorie is at least lower than in the case of coal, Italy's competitive position has not been substantially strengthened thereby except where fuel-oil is sold below the world market price. Although, as will be shown later, natural gas prices have to a certain extent been a function of the price of fuel-oil, the influence of this fuel has been much more marked. The consumption of energy from domestic sources increased from 45% in 1938 to 49% in 1955, notwithstanding an increase of 70% in total consumption.

In Roumania the consumption of natural gas accounted for 33% of all energy utilised in 1956.

While the organisation of the natural gas industry in a country is the outcome of the interplay of a number of peculiar political, administrative and geographical factors, it is also associated with the rôle assigned to it in the economy. It has therefore appeared preferable to study at one and the same time both its position in the economy and the organisation of the industry, which extends, through a number of intermediate forms, from outright autonomy to integration in the economy of the gas industry.

Italy, whose natural gas resources have been developed recently and on a substantial scale, affords a practical example of the position which methane has acquired in a country's economy and merits a detailed analysis. In Italy, as in many other European countries, the structure of the energy balance-sheet has undergone a marked change since the war. But whereas everywhere else the increasingly important position occupied by liquid fuels has been the essential feature of this change in Italy natural gas has also played an outstanding part.

It is obvious that the availability of an excellent indigenous fuel at an attractive price speedily distributed through a closely-knit transport network throughout the valley of the Po (in which 70% of Italy's industry is concentrated), was bound to constitute a powerful factor in industrial development. This advantage was particularly striking during the reconstruction period, however, when Italy's trade balance showed a heavy deficit and when it was essential to raise the standard of living. and it is precisely during this decade that the production of natural gas rose from 64 mill. cu. m. to 3,627 mill. cu. m.

Powerful Stimulant

In point of fact, natural gas has played, and continues to play, the part of a powerful stimulant of the economy. The investments needed to develop its use have given a powerful impetus to many sectors of the country's economy. Its rapid development has provided a body of experts and skilled workers, and it has been necessary to produce equipment for the exploitation of natural gas and for the institution of the consuming industries. Lastly, it has made possible the creation of a powerful petrochemical industry.

Natural gas has thus proved a factor of fundamental importance to the Italian economy, and it can be said without exaggeration that it has provoked a veritable industrial revolution. The exploitation of natural gas in Italy is a typical example of the use of methane to improve the economic position of a region that is already heavily industrialised. The organisation of the natural gas industry in Italy is the outcome of a historical evolution largely conditioned by the economic circumstances outlined above. The origins of this process date

far back into the past and are closely allied to those of the petroleum industry.

It has now been decided to set up a State organisation, known as 'ENI' (*Ente Nazionale Idrocarburi*) to promote and carry out projects of national importance in the field of hydrocarbons and natural gases. Accordingly, all existing State interests in this field have been brought together in one integrated system. The ENI controls a number of subsidiary companies, with their own branches and sub-divisions. With its monopolist position, the ENI practically controls relations between the gas distributing companies and the natural gas industry. There are three methods of distribution: Methane can be sold direct to gas distributing enterprises; it can be sold through an ENI subsidiary (Metano Città), or it can be sold through joint companies in which Metano Città holds 50% of the shares and the municipal authorities the other 50%.

Natural gas was exploited in Poland even before the war, and volumes comparable to those now produced were already available. The industry therefore possesses many years of experience, and has long been a substantial supplier of gas to consumers in Poland. At the present time, natural gas, with 4,280 bill. (British reckoning) kcal, accounts for more than 31% of the country's available gas supplies expressed in calories. The natural gas industry in Poland affords a typical example of the integration of the natural gas industry in the gas industry as a whole at the managerial and administrative level, although geographically it often has *de facto* autonomy, since it mainly serves the south-western part of the country.

Partly Autonomous

The petroleum industry carries out the geological prospecting, makes soundings, and drills and works the wells through which the gas is extracted. The gas extracted is sold to an enterprise, under the Central Gas Directorate, which is responsible for its transport and sale. This enterprise has three independent managements and thirty-five local sections distributed over five voivodies. It sells most of the natural gas direct to large industrial undertakings, but sometimes supplies domestic users as well. It also sells to towns which have their own gasworks but need to supplement their production, and to others which rely entirely on natural gas. In both cases the gas is distributed by the local bodies. The Polish system is an original one in that a partly autonomous enterprise is responsible for the integration of natural gas in the gas industry as a whole.

In Roumania, where energy resources in 1955 included 10.5 mill. tons of petroleum and about 6 mill. tons of hard coal and lignite, natural gas, the total production of which is 5,800 mill. cu. m., including gas extracted from petroleum wells, represents more than one-third of available primary energy. Its production has been considerably expanded in the post-war years. Natural gas, which is practically the only source of gas distributed through piping systems, is in fact, in Roumania, a by-product of the petroleum industry, to which it is closely allied.

The natural gas industry in the U.S.S.R. has developed steadily in recent years. The calorific value of this gas ranges from 8,000 to 9,000 kcal cu. m. At the present time the natural gas industry in the U.S.S.R. is Europe's largest and has greatly expanded in recent years. About 80% of total fuel used at present in Moscow, for example, is natural gas. As regards the structure of the industry, the gas industries in the U.S.S.R. and the Ukraine did not form a unified system until recently; their consolidation is now being carried out.

In Austria, the only outlets for natural gas at present are two large public services, the Vienna gasworks and the Vienna electric power supply corporation; however, the construction of an extensive transport network, which is contemplated, is bound to change the situation. In West Germany, too, the natural gas industry is in its infancy. On the production side it is in the hands of the petroleum industry, while on the consumption side its main outlet is industry. In the matter of transport, it is allied to the gas industry.

There remain the natural gas industries of France and the Netherlands; they are in full development and are giving rise to economic policies and to organisational research projects of a highly original nature. These industries will be the subject of a special analysis in the last part of this paper, when the future prospects for natural gas are reviewed.

Many of the points noted above are explained by the relative importance of natural gas in the gas economy as a whole, which affects the part played by natural gas and the organisation of the industry. The following table illustrates this.

THE POSITION OF NATURAL GAS IN THE GAS INDUSTRIES OF A NUMBER OF EUROPEAN COUNTRIES
(in bill. calories and shown as a percentage)

Country	Natural gas distributed	Manufac'd. gas distributed	Total	Percentage of natural gas
Austria (1955) ..	4,551	2,849	7,200	60.4
France (1954) ..	2,235	18,408	20,643	10.8
West Germany ..	2,060	62,436	64,496	3.2
Italy (1955) ..	32,889	6,552	39,441	83.4
Netherlands (1955)	620	10,336	10,956	5.7
Poland (1955) ..	4,464	9,564	14,028	31.8
Roumania (1954) ..	51,700	—	51,700	100.0
U.S.S.R. (1955) ..	76,272	5,922	82,194	92.8

There is obviously a relationship between, on the one hand, the place and organisation of the natural gas industry in the economy and on the other hand the structure of consumption. If natural gas is regarded primarily as a means of augmenting industrial potential by supplying energy to industry at attractive prices, direct sales to large industrial consumers will be the first aim, but if natural gas is regarded simply as a supplement to existing gas resources, then consumption will be spread over a wider field, including, in particular domestic requirements.

The structure of consumption itself exerts an influence on the industrial economy, and before an analysis of consumption by sectors in the various countries is undertaken it will be appropriate to enumerate the essential features of the various uses. It will then be easier to assess accurately its influence on the economy of the distribution systems.

Natural gas sales in most countries are mainly for thermal uses, among which a distinction should be drawn between industrial and domestic uses. Methane can be used industrially for two different purposes, for heat treatments and for the generation of steam. In general, steam-boiler heating constitutes neither the largest area of industrial use, nor the most advantageous employment of this form of energy. Methane is particularly suitable for industrial furnaces, where its operational flexibility and its purity place it in a class apart. For thermal purposes methane may have to compete with liquid fuels, but it has the advantage of not requiring storage tanks and of involving less wear and tear on the equipment used, which is often less costly into the bargain. In metallurgy, methane has so far been used mainly for non-ferrous metals, but research is proceeding with a view to its application in the iron and steel industry for the production of high-concentration iron sponge. The technical and economic prospects seem favourable. In cement works, heat treatments in engineering and in the majority of other industries, methane is also valuable on account of its high efficiency and its operational flexibility although, subject to special local conditions, it would perhaps be more appropriate to reserve it for more exacting uses.

Striking Advantages

The advantages of gas, even at high tariff rates, are particularly striking in this sector. While seasonal fluctuations may hinder the development of consumption, sales to domestic users may pay well on account of the profitable tariff rates which its convenience in use justifies.

As has already been stated, the chemical industry can utilise large quantities of natural gas as a heating agent. In addition, gas can be used as a raw material in the manufacture of a large variety of chemical products. Within the framework of the present study there can be no question of considering in detail all the possible uses of natural gas as a raw material in the chemical industry; it will suffice to emphasise a few specific points.

In some cases sulphur production is practically compulsory.

About one-third of the gas obtained from the Lacq deposits is to be used for sulphur production. The production of acetylene and its derivatives is being developed in Italy, where the Ravenna works will shortly be manufacturing synthetic rubber from acetylene, and in Roumania, where it is intended to manufacture plastics and synthetic fibres. It should be noted, however, that the production of acetylene from refinery gas is no less profitable. Mention should also be made of ammonia and nitrogenous fertilisers, ethylene and carbon black.

The chemical uses seem to exhibit common features, listed below, which include both advantages and drawbacks. The volume of investment is relatively high, being about three times as high as for thermal uses; the particularly high efficiency of natural gas in chemical applications partly offsets the heavy financial outlay. In Italy, for example, about 400 litres of methane or 1 kg of coal are required for the production of 1 cu. m. of hydrogen, whereas in electric power production 400 litres of methane are equivalent to only 600g of coal. There is no doubt that natural gas undertakings prefer the chemical industry as a customer, on account of the volume consumed and of the regularity of the demand.

Transport Cost

Methane is not more suitable than fuel-oil for the production of electric power. Nevertheless, its use for this purpose has developed fairly rapidly in some countries which are large producers of natural gas, mainly for reasons of cost. Moreover, it is generally more economic to supply methane to local power stations than to supply it to large units for long-distance power transmission, as the transport cost of natural gas is lower than that of electricity. Natural gas undertakings, on the other hand, find it more profitable to sell methane to power stations at the well-head.

While the differences in consumption structure, which depend on geographical conditions and historical circumstances, are obvious, it is nevertheless possible to make certain general observations before passing on to particular cases. The first is that industrial consumption is generally larger than domestic consumption. The reason for this situation is that the natural gas industry has usually been developed in the form of ordinary industrial undertakings seeking the most profitable market, whereas manufactured gas has largely been tied to the requirements of public distribution. For the special reasons stated earlier, Austria is at present the only country constituting an exception to the rule.

A second point is the relative importance of the chemical industry in the industrial sector in many countries: 39.8% of total natural gas consumed in France, 23.1% in Italy, 14% in Poland and Roumania. Lastly, a characteristic feature is that electric power generation sometimes plays a very important part in natural gas consumption: 51% in Austria, 13.9% in Italy, 20.4% in Roumania in 1954 and 18.2% in the United States.

The present structure of natural gas consumption is the result of a choice made immediately after the war in the light of the following considerations. It was observed that, in 1938 (the last normal pre-war year), 72% of calorie consumption in the industrial sector was used for steam generation and furnace heating, and that the major part—more than four fifths—of this came from coal, which was largely imported. To improve the trade balance, therefore, efforts had to be directed mainly to this sector. Moreover, since the conversion of industry to the use of methane was particularly easy, it was possible to anticipate rapid exploitation, whereas the conversion of existing distribution networks to the handling of natural gas required some time. Natural gas, competing directly with imported coal and imported liquid fuels, was bound to make a telling contribution to price stabilisation. Judging by the example of the United States, natural gas should make it possible to set up a large chemical industry.

Two uses had to be considered from rather different viewpoints: The production of electricity to supplement hydro and thermal production, the economics of which was subject to variation according to the situation of the generating stations and their peak-supply or base-supply role, and supplying the domestic sector. With regard to the latter, judging by 1938 figures, the use of natural gas instead of manufactured gas should make it possible to save about 1,400 mill. tons of imported coal, or 15% of total consumption. On the other hand, the by-products of hard coal distillation, and in particular 1 mill. tons of coke, would then be lost.

In the light of all the foregoing considerations, it was felt appropriate to establish an order of priority to accord preference to industrial uses in the structure of natural gas consumption in Italy. That order, therefore, did not develop haphazard out of market demand, but from systematic planning in which industrial uses were accorded a priority position.

The chemical industry accounts for 21%—7% as raw material of Italy's total consumption of natural gas and the remainder as fuel. From the economic point of view, and in particular on account of the simple molecular structure of methane, which is the main constituent, Italian natural gas is particularly well suited to the production of ammonia, methanol, acetylene and various other substances. The ENI has supplied, on particularly favourable terms, large quantities of gas for synthetic processes. Thus the production of synthetic ammonia expanded considerably in Italy from 1952 to 1955, and methane played a large part in that expansion.

A number of new plants are at present under construction. The largest, situated near Ravenna, will produce 150,000 tons of synthetic ammonia annually, and this will be used for the production of 600,000 tons of nitrogenous fertilisers and 35,000 tons of synthetic rubber of the G.R.S. type. It will thus be seen that the development of an important chemical industry is an essential factor in the expansion of methane consumption in Italy.

Nowhere has the consumption structure of natural gas changed in the last few years so much as in Poland. Natural gas consumption underwent a veritable upheaval during the period under consideration, which witnessed a substantial increase in domestic consumption and a considerable reduction in the use of methane for industrial boiler heating (including the petroleum industry), the figure relating to this latter use having declined from 50% of the total before the war to 24% in 1950, 14.8% in 1952, 12.5% in 1953 and 7.9% in 1954. In fact, this upheaval reflects the changeover from the natural gas industry regarded as an annexe to the petroleum industry to the natural gas industry integrated in the gas economy as a whole.

At the present time the structure of natural gas consumption in Poland, which is essentially keyed to industry and, more particularly, to the metallurgical and the engineering industries, is a result of the siting of user undertakings in the areas supplied with natural gas. To a large extent, this siting trend dates from before the war. On the other hand—and this is a second factor which has determined the present structure of consumption—it has been felt necessary to deliver natural gas to the south-westerly areas of the country when their coke-oven gas resources were inadequate. Lastly, the production of the chemical works, for which natural gas is an eminently suitable primary material, has been the third determining factor.

Roumanian Innovation

Natural gas was used in Roumania in 1954 in the proportions of 14% by the chemical industry, 44% by other industries, 9% for domestic purposes, 12% for space heating and 4% for electric power generation. The petrochemical industry based on natural gas is an innovation in the Roumanian economy; it has largely originated in the last ten years, is now in full development and is mainly concentrated on the production of nitrogenous fertilisers after cracking of the methane to obtain synthetic gas, the production of lampblack from low-pressure gas in the upper strata of wells, the production of acetylene by electro-cracking or partial oxidation, as well as formaldehyde, oxalic acid, carbon tetrachloride and other similar substances produced from methane. The scale of methane consumption in the generation of electric current was also high.

There is no need to stress the structure of natural gas consumption in the other countries, either because it is still unstable, as in Austria because it will be completely changed by the setting up of a transport network, or as in France where the present restricted market is bound to expand considerably with the exploitation of the Lacq gas deposits to which reference will be made later in this report. There is as yet no very extensive transport network in West Germany, and sales are mostly direct to consumers near deposits; these consumers are the chemical industry mainly, with the metallurgical industries and a few textile mills. However, the feeder

from Bentheim to the Hüls chemical works was extended, in 1955, to Dorsten, where a large total gasification plant producing gas with a calorific value of 3,900 to 4,000 k. cal. per cu. m. has begun operations. Natural gas is used to raise the calorific value of this gas in order to make it suitable for distribution through the transport network, and it serves as a means of enhancing the flexibility of the gas industry. Part of the production of the Rehden deposit is supplied to metallurgical industries in the Osnabrück area, while the Bentheim deposit supplies a few textile mills in the Nordhorn area.

There is no doubt that, on the whole, the consumption of natural gas is concentrated on industrial uses. Economic conditions in the various countries are largely responsible for this, though in many cases the economics of the natural gas networks themselves has promoted this specialisation. It is indeed a fact that the structure of consumption has a considerable influence on output variations, in other words on the co-efficient of utilisation.

Industrial uses are subject to the influence of changes in the business cycle, these being slower and less frequent than the seasonal and even hourly fluctuations in demand which are typical of domestic uses or of electric current production wherever units other than basic units are concerned. In general, therefore, it may be said that industrial uses, and more particularly chemical uses, exhibit the most favourable coefficient of utilisation.

By way of comparison, it is interesting to note the fluctuation observed in the United States for the various uses of natural gas, although it is not computed on the same basis, since it relates to the ratio of mean daily output to peak daily output.

DAILY FLUCTUATION IN THE VARIOUS SECTORS IN THE UNITED STATES
(Ratio of mean daily output to peak daily output)

Sector	1954	1958 forecasts
Industry (firm contracts)	75.4	77.8
Commerce	33.4	32.4
Domestic heating	20.6	20.9
Other domestic uses	79.6	78.4
Total of firm contracts	41.1	39.8
Grand total (including interruptible contracts) ..	56.7	52.1

It is claimed, with regard to France, that the influence of the consumption structure also affects the hourly fluctuation, which is of the order of 0.47 for domestic purposes, 0.82 for the synthetic chemicals industry and 0.75 for industry as a whole, including the chemical industry. In the case of Poland, the widest variations in consumption are said to be encountered in the fields of industrial steam boiler heating and domestic uses, on account of the heavy proportion of heating in this latter item. The peak load represented by these two items was of the order of 10 mill. cu. m. per month during the 1955 winter season.

Consumption Variations

In Italy, the sectors which have the last favourable influence on the output of the networks are peak-load electric power stations and domestic consumption—the latter especially when it includes heating. Where electric power stations are situated in the immediate neighbourhood of gas deposits, their consumption variations do not affect the network, but may affect the operation of certain subsidiary installations connected with the deposit, such as desulphurising and other by-product plants. Where electric power stations are sited at a point in the network and are used for the basic production of electric current, they may act as a regulator. Such is not at present the case in Italy, where the power stations intended to take the place of hydro-power from the Alpine dams during the period from November to March, when hydro-power output is lowest, operate for approximately half the year, when the demand for domestic purposes is heaviest. The latter depends on the demand for heating and so, on climatic conditions, and secondarily, on the standard of living of the population. The influence of these two sectors is such that the daily winter maximum is approximately four times as high as the summer minimum. In West Germany, the fact that natural gas is mainly supplied to industry and, in particular, to the chemical industry, reduces the problem of consumption variations to a negligible factor.

The 'modulation,' or coefficient of utilisation, has a major influence on the gas economy in general, but it exhibits certain special features in the case of natural gas.

The magnitude of the fixed investments in equipment, production plant and pipelines is typical of the gas industry in general. Though particularly important in the case of manufactured gas, the problem of the employment of this equipment is basic to the economy of every gas undertaking. In the case of natural gas, by far the most substantial item of fixed costs is represented by the distribution mains, and in particular by the transport network. Accordingly, it is appropriate to furnish data on the economy of the transport networks. In this field the problem is two-fold since it involves both distance and quantity.

The cost price per cu. m. transported is, in fact, a function of the following factors—capital costs and financial charges for piping systems, capital costs and financial charges for pressure-boosting stations, maintenance costs, and cost of pressure-boosting.

Two essential factors, the capital costs for piping systems and the maintenance costs, vary in proportion to the length of the piping system and in inverse proportion to the output. In other words the more fully a piping system of given cross-section is used, the sounder are the economics of the network. If a piping system is fully utilised for only a short time that means that excessive amounts of capital have been invested in relation to the quantity of gas sold, and unless the co-efficient of utilisation is adequate considerable capital sums are locked up; the weight of a given length of piping varies as the square on the internal diameter, and the latter depends on the maximum volume of gas carried at a given pressure. Accordingly, the economy of natural gas should be viewed in the light of this co-efficient of utilisation.

It is important, at the outset, to distinguish between two types of network. A first type, which is common in the United States and the Soviet Union, transports a large volume, of the order of 10 mill. cu. m. per day, from the production centre to a consumption centre which is often as much as 1,000 km. away.

Rapid Progress

The natural gas industry in the U.S.S.R. went rapidly ahead after 1946, when the main artery from Saratov to Moscow was completed; it is 800 km. long, with a daily throughput of 1.5 mill. cu. m. The production of natural gas and the construction of feeders have greatly increased since. The Dashava-Kiev pipeline was brought into operation in 1948 and was extended to Moscow in 1951, making a total length of 1,300 km. from the Carpathians with a daily throughput of more than 5 mill. cu. m. The over-all pipeline system shown on a map appended now forms what is practically a unified transport network. Its similarity with the United States network appears from the map of that network which is also appended. In such cases, the most economical method is to lay a pipeline of the largest possible diameter, and increase the number of pressure-boosting stations as output rises, until the maximum density—with the stations from 150 to 200 km. apart—is reached.

The situation is quite different in most European countries; the population density is much higher, and as the price of natural gas is attractive (other things being equal) the tendency is for the gas to be tapped all the way along a pipeline, which will rarely require pressure-boosting stations. Consequently, the problem consists in seeking the most suitable pipeline diameter, i.e., the diameter which cuts down steel utilisation to the lowest possible level, thereby reducing necessary investment to the minimum.

In Italy, for example, it has been ascertained that the most economical conditions involve a pressure of 50 to 60 kg. per sq. cm., and that economic transport distances extend from 240 km. for an output of 800,000 cu. m. daily to 470 km. for an output of 5 mill. cu. m. daily, with no pressure-boosting station; these data are fairly close to those computed for France. The more closely the practical conditions of operation approach the ideal, the sounder is the economy of the network.

The relationship between the coefficient of utilisation and the cost per cu. m. of gas conveyed in Italy shows that, while the

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The **NEW WORLD** Convector is flueless and may be connected to gas from either side in any convenient position.

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All Gold
Gold outer case with cream front

All Bronze
Nubian outer case with cream front

Height: 26 in. **Width:** 18¼ in. **Depth:** 5¾ in.
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cost per cu. m. declines with extreme rapidity when the level of pipeline utilisation approaches its maximum capacity, 90%, for example, as in the case of the chemical industry, it rises to almost double in the case of domestic users and thermal power stations in Italy.

In Poland, most long-distance pipelines operate throughout the year with a utilisation coefficient approaching unity; seasonal variations and periods of incomplete utilisation affect only a part of these pipelines, and the average co-efficient of utilisation is, accordingly, 85% to 90%.

If, for reasons of a general nature or because uses with a favourable fluctuation pattern are unable to consume sufficient volumes of gas, natural gas has to be sold to users more exposed to seasonal variations, it is necessary to take such steps as may be appropriate to alleviate the economic disadvantages inherent in such uses.

The adjustment of consumption to the economic requirements of production and of the natural gas networks can be effected by technical measures to offset irregularities of demand, by the economic selection of consumption sectors, by legal means, and, lastly, by regulatory measures.

Technical measures fall into two categories—measures to increase storage capacity, and measures to bring supplementary production plant into operation at peak periods. Underground storage must be considered first. In France, the *Société Nationale des Pétroles d'Aquitaine* is investigating the possibilities of underground storage, in the Lanes, and similar investigations are proceeding almost everyhere. An underground reservoir is mentioned in Poland, but few European natural gas producing countries have adopted this method. In Roumania, Ukraine and the U.S.S.R., the use of possible underground storage capacity is being investigated. In Italy, moreover, it is felt that, in view of the wide dispersion of consumption centres, underground storage would not solve the winter peak problem.

In France, public distribution undertakings have taken over old coal gas holders which will henceforth be able to store twice the former calorific value. The output dispatching services try to increase pressure to the maximum during low-consumption periods, so that gas mains can serve as gasholders. The benefit of this operation lasts only a few hours, however. Thus, the mains are 'blown up' to capacity on Sundays to meet the Monday-morning demand. It is obvious, however, that this is merely a palliative which cannot compensate seasonal variations.

Liquid Storage

Potentially, storage in liquid form constitutes an attractive form and is practised in the Soviet Union to deal with consumption variations in the Moscow area. The gas is cleaned and dried, liquefied by refrigeration (its volume being thereby substantially reduced), stored in liquid form and, then gasified as needed. The existing installation has a storage capacity of 2 mill. cu. m. of gas in liquid form.

Lastly, mention should be made of the—rather costly—method of storage under pressure.

Supplementary production plants are widely known, and are mainly designed for the gasification of petroleum products. It is also possible to use solid-fuel gas producers. The drawback to such installations is, of course, their high cost due to their mode of operation, the intermittent nature of which entails a poor coefficient of utilisation.

It is possible to mitigate the drawbacks inherent in irregularity of supply by drawing up compensation programmes, i.e., by encouraging consumption in sectors which offset those in which the demand is irregular, and by discouraging the demand of the latter to some extent by the use of the price mechanism.

There are several price policies to choose from—sale at uniform prices, which is tantamount to equalising costs over the whole body of consumers—in other words, making some of them pay for part of the services received by the others; sale at use value, which consists in charging the consumer in every category the highest price he will agree to pay; and sale according to cost at delivery point. A further type of sale might be added, that based on the social or public utility of the respective sectors, this method being designed to assist certain groups of consumers in preference to others. It is possible, moreover, to combine these various formulæ and, for example, to sell at a flat rate based on cost and apply special tariffs based on use-value. The aim will be to influence the structure of the market according to the policy adopted. For example, sale at use-value will affect the structure of consumption by sectors, while sale based on cost at delivery point will mainly affect the geographical structure of consumption.

A combined price system is used in Italy. It should not be forgotten that natural gas first appeared on the Italian market as a marginal resource. While that is no longer the case, the need to use imported fuels has led to the linking of the price of natural gas to that of the other fuels. This practice, adapted to the conditions of a competitive market, has made it possible to obviate excessive disparities between users of natural gas and those whom their geographical location compels to use other fuels. The fact that, in this way gas sellers receive a bonus raises no special problem where the seller is a government body investing government funds.

Reference Fuel

A distinction must here be drawn between chemical and thermal uses. In the latter case the price was fixed on the basis of the price per calorie of the cheapest competing fuel, taking into account on the one hand the cost of adaptation to methane, and on the other the technical and financial advantages of natural gas, namely, reduced plant depreciation and savings on storage tanks.

In practice, the reference fuel was fuel-oil, which, of all the forms of energy, is that which competes most directly with natural gas. Prices were determined in accordance with the following formula:

$$\text{Price of gas} = \text{price of fuel-oil} \left(\frac{\text{gross calorific value of gas}}{\text{gross calorific value of liquid fuels}}\right) K$$

where K is a higher utilisation efficiency coefficient of natural gas equal to 1.05.

It is interesting to note a few special features of this formula: the price of natural gas does not depend on the distance separating the consumer from the deposit, but is the same throughout the area served by the network. With regard to liquid fuels, the price at the coastal depôt has been taken for reference purposes, the cost of transport being disregarded, thus assisting natural gas consumers in the interior. Lastly, in computing the coefficient K, no account has been taken of many of the technical, financial and organisational advantages which attach to the use of natural gas by virtue of its purity, its high calorific value and its convenience in use. In practice, the advantages of methane in the matter of cost price are fairly substantial. For an open-hearth steelworks an advantage of 24% in relation to fuel-oil is quoted. For gasworks and electric generating stations the price relationships are even more remarkable. Elsewhere, however, it has been decided to take steps to promote regularity of consumption by granting a rebate to consumers who agree to take a certain quantity of gas regularly.

In the case of chemical uses, it is obvious that the principle of calorific equivalence could not be applied in fixing prices for natural gas supplied to the chemical industry for synthesis. In chemical works, and especially in existing circumstances in Italy, natural gas has a high utilisation value, but the capital investment required is considerable, being about 150 mill. lire for every mill. cu. m. consumed, as against about 50 mill. lire where thermal uses are concerned. It therefore seemed to accord with the national interest to fix a price lower than that adopted for thermal uses in view of the large and steady consumption by the petrochemical industry. And it is this policy, leading to the supply of a primary material to the petrochemical industry on favourable terms, that has enabled this branch of economic activity to be created and developed in Italy.

In December, 1955, the mean price of natural gas sold by the SNAM and directly by Agip Mineraria subsidiary companies of ENI was 12.2 lire per cu. m. for thermal uses and 7.6 lire for chemical uses, inclusive of tax. Generally speaking, it can be said that the chemical industry receives the most favourable treatment because of the regularity and volume of its consumption. This very deliberate policy has, however, achieved the desired result. The Committee of Experts recently set up by the Ministry of Industry to co-ordinate the uses of natural gas within the framework of the country's power economy has concerned itself with price structure as a means of promoting that co-ordination, and has considered the possibility of introducing a two-way tariff for natural gas.

So far, the price of natural gas in France has been freely discussed between seller and buyer, in accordance with the

law of supply and demand, on the basis of formulæ having two terms, one constant and the other variable. When Lacq gas is developed, the principle applied in the case of manufactured gas (sale based on cost at each delivery point) is likely to be applied to natural gas also. Low prices would then be the rule in the south-west near Lacq, thus encouraging industrialisation of that area, while increasingly higher prices would be applied the further the distance from the gas well. The basic price is 6 fr. per cu. m. for substantial quantities and utilisation for 8,000 hours. This basic price will be increased by the cost of transport through the principal pipeline network, and by commercial charges. Prices are for direct industrial deliveries under contracts for at least five years and are geared 50% to heavy fuel-oil No. 2 rates and 50% to steel. They do not apply to public distribution, which is governed by the tariffs of *Gaz de France*.

Development of Industry

There is no doubt that this method is likely to promote the establishment of certain large-consumption industries at the point of origin of the transport network, as is the case with the chemical industry, in which the cost per cubic metre of gas is an important cost factor. Nitrogen and plastics manufacturing plants in particular would benefit if set up in the gas-producing area. If applied strictly, this principle might cause some difficulty over the network as a whole, but in practice an additional measure will be introduced for the specific purpose of bringing the whole scheme into balance. Consumers will have the choice of two tariffs.

The first will comprise a substantial fixed charge (70% to 80% of the average price), depending on volume contracted for, on a downward sliding scale, and transport distance, this fixed charge constituting the demand-regulating factor; and a variable charge depending on consumption. The second will comprise a much smaller fixed charge (25% to 40% of the average price); and a variable charge depending on consumption, but at a lower rate in the summer than in the winter so as to encourage consumption during slack periods. The first tariff may suit regular consumers, while irregular consumers may find it to their advantage to choose the second. Thus, while based on quite different principles, the tariff structure set up in France is seen to be, like that obtaining in Italy, a powerful instrument for improving the coefficient of utilisation of the network.

Poland has a differential tariff, the purpose of which is to promote consumption in the most stable sectors of industry. Thus, natural gas is sold at 0.70 zloty per cu. m. for thermal uses and at 0.30 zloty per cu. m. for synthetic purposes. These prices are much more favourable than those of coal for the same purposes. In addition, the following penalties are provided—for each cu. m. consumed in excess of the specified monthly consumption limit (shown below): A 100% price increase; for each cu. m. consumed in excess of the daily or hourly peak-consumption limit, 0.50 zloty; and where consumption falls below the specified monthly consumption, for each cubic metre in deficit, 50% of the price.

The practice of interruptible contracts, which is extremely widespread in the United States and is arousing keen interest in Europe, consists in authorising the distributing company to cut off the supply of gas when the demand exceeds the capacity of the installations. It is, however, not always feasible because the supply of gas has to be combined with that of some substitute fuel—in practice fuel-oil or liquid petroleum gases. It is easier in cases where the natural gas distributor is also a supplier of competing fuels.

There is no doubt that the close ties between the petroleum industry and the natural gas industry in America have facilitated the development of such contracts. The same applies to a considerable extent in Italy, where the possibility of introducing such contracts has attracted attention, including that of the Committee of Experts, which has recommended their development, especially as the replacement of natural gas by other fuels presents no technical difficulty. Natural gas supply contracts in Italy include a clause providing that the volumes available for the consumer must be used as evenly as possible. It is generally specified that the maximum quantity consumed in any day may in no case exceed the stipulated quantity by more than 15%, while the maximum hourly output may not exceed by more than 35% the mean hourly output computed by dividing the daily quantity contracted for by the number of hours in the working day. As, however, no penalty is stipulated for exceeding these quantities, in practice the clause is not very effective.

In France nearly all natural gas sales contracts cover continuous supply for at least five, generally for ten years. It is intended, however, to increase the number of interruptible contracts very considerably in the future, mainly for the purpose of reducing seasonal (low summer consumption) rather than weekly (low Sunday consumption) or daily irregularities (low night-time consumption). That is why the prior notice may be quite long, up to several days.

In continuous supply contracts, *Gaz du Sud-Ouest* reserves the right not to meet hourly peak demands if they exceed the figure contracted for or authorised. In some cases the figure contracted for may be revised by common consent between the vendor and the consumer, if supplies are available. As a general rule, in the Netherlands, contracts concluded by the State with municipalities for the supply of natural gas contain a provision that the number of units supplied per hour shall not exceed the equivalent of one six-hundredth of the number of units supplied during the previous twelve months.

It has been stated earlier that Poland uses technical and economic methods to ensure some degree of regularity in the consumption of natural gas, but it also uses administrative methods. The features of the system are as follows:

1. Regulations lay down the uses to which gas of high calorific value may be applied (chemical industry, thermal uses in metallurgy, engineering, the glass and ceramics industry, etc.). The use of natural gas for such purposes as boiler heating and factory floor-space heating is prohibited, a measure which appreciably restricts seasonal variations.
2. Every establishment whose monthly consumption of natural gas exceeds 10,000 cu. m. is required to prepare an annual forecast of anticipated demand. The same applies to establishments producing natural gas.
3. Repairs to production plant are encouraged in summer and those to consumption plant in winter.
4. Strict regulations concerning peak demands by industrial establishments have been drawn up. They include the following:
   (a) Daily peaks; daily consumption is limited to a specified fraction of the fixed monthly consumption—for consumers using less than 100,000 cu. m. per month this figure is 1/20th, for consumers using over 100,000 cu. m. per month but where consumption is continuous except during holidays it is 1/27th, and where consumption is intermittent, 1/23rd.
   (b) Hourly peaks, permitted consumption, still in fractions of the fixed monthly consumption, may not exceed—where three shifts are worked and consumption is less than 100,000 cu. m. per month, 1/150th; where three shifts are worked and consumption is more than 100,000 cu. m. per month, 1/500th; where two shifts are worked, 1/325th; and where one shift is worked, 1/500th.

Managers or heating engineers of user undertakings incur a penalty if they fail to observe the regulations, which are enforced by the State Gas Inspectorate. Similar administrative methods are used in Roumania and the Soviet Union.

Necessary Condition

While methods differ—sometimes considerably—from country to country, and while none in itself seems adequate to ensure regularity of consumption, in combination they do produce results, and the efforts which have been made to apply them emphasise the importance attached in all countries to securing a high utilisation coefficient, a necessary condition for an economical cost price.

Turning to future development plans, while natural gas seems bound to undergo considerable development, obviously forecasts cannot anticipate the results of the exploratory drilling now being undertaken almost everywhere.

In Italy the present structure of the industry, serving a vast industrial region, should make it possible to absorb the additional quantities available without great difficulty and without any far-reaching change in uses. It is estimated that relatively higher proportions of natural gas will be taken by the chemical industry, in which demand is continually increasing, and by the domestic sector, for which natural gas is an ideal fuel

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because of its flexibility in use and its high calorific value. On the other hand, the use of gas as a traction fuel, which necessitates the provision of heavy containers, will continue in the future to be confined within narrow limits. Geographically it is difficult to say whether gas consumption will develop within the present regional framework or will spread fairly widely beyond its limits. The result of the drillings for natural gas and for petroleum will settle this question; it is even possible that petroleum will ultimately prove more important.

Sound Foundation

In Roumania the development of natural gas is closely tied to that of the chemical industry, which is provided, through the quality and diversification of existing types of gas, with a very sound foundation for the manufacture—starting from acetylene—of plastics, synthetic fibres, acetic acid, acetone and synthetic rubber. Nitrogenous fertilisers will also be produced. The development of the production and consumption of natural gas in Roumania depends mainly on the transport and distribution network. A new factory for large-diameter pipes is to go into operation in 1957, and a large increase in the consumption of natural gas is to be anticipated thereafter.

In the U.S.S.R. the prospects of increased production imply a considerable expansion of the transmission network under particularly favourable circumstances which probably approach those prevailing in the United States. This is true of the pipeline, 500 mm. in diameter and 1,000 km. long, which is to connect Dashava to Moscow. It is also true of the Stavropol-Moscow pipeline, 700 mm. in diameter, which will have only one pressure-boosting station throughout the 1,500 km. of its length.

The use of Lacq gas in the near future raises a number of economic problems which it is interesting to compare with those for which a solution has been found in the case of Italian natural gas. While the methane of the Po Valley was situated near the large industrial outlets, Lacq gas, on the contrary, was discovered in a relatively under-developed area of France.

This situation gave rise to a good deal of controversy between those who wanted the entire field to be reserved for the use of the South-West region and those who wanted the transport and distribution network to be extended over a wider area. At present the problem seems to be limited in scope by the need to create a regional industrial basis that is still practically non-existent. The presence of natural gas is obviously incapable by itself of stimulating large-scale industrial development. Hence, opinion seems to be moving towards a compromise between the two schools of thought, inasmuch as the reserves of gas at Lacq are more than the regional market can absorb in the immedate future.

In addition to thermal uses (domestic consumption and industries) the outlets envisaged are mainly the production of ammonia and nitrogenous fertilisers, acetylene and perhaps heavy water in the South-West. Very large quantities of gas will be used for generating electric power, especially at Lacq, for the production of aluminium and at Bordeaux at a power station combining the use of natural gas and fuel oil. It is likely that the transport network will spread beyond this area and reach the areas of St. Etienne and Lyons on the one hand, and the West Central and Western region on the other; it may perhaps reach the Paris area also.

Structure

It is interesting to note the structure of the natural gas industry as it appears now that the Lacq deposit is coming into exploitation. The deposit itself will be worked by the *Société Nationale des Pétroles d'Aquitaine* (S.N.P.A.), but for the purpose of a common transport and sales policy a new company has been set up, the shares in which are held as follows—*Régie Autonome des Pétroles*, 35%; *Société Nationale des Pétroles d'Aquitaine*, 35%; and *Gaz de France*, 30%.

This company is the *Société Nationale des Gas du Sud-Ouest*, whose function is to transport and market the gas at the regional level. It transports the gas and sells it, on behalf and for account of the producers, to private customers for industrial uses involving consumptions exceeding 5 mill.

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therms per annum and to licensees of public distribution services, *Gaz de France* and municipal authorities for consumptions below that figure.

Outside the south-westerly area, another body will take over transport and sales on similar terms. This is the *Compagnie Française du Méthane* (in which the *Société Nationale des Pétroles d'Aquitaine* and *Gaz de France* each hold 50% of the shares); this company will own the gas, but the distribution mains will be the property of *Gaz de France*.

Thus, starting from an almost entirely autonomous organisation in an area in which industrialisation promoted by direct sales seems likely to predominate, there is a changeover to amalgamation with the gas industry proper in the areas in which distribution is likely to be more diversified.

The Commission for the organisation and regional supply of gas set up by the Netherlands Ministry of Economic Affairs has, in a report dated January, 1956, made interesting proposals concerning the organisation of natural gas in the country and particularly concerning its transport. This report recommends the setting up of a national gas company in which a number of regional bodies and individual producers would participate. Under the auspices of this company a conversion plant would be erected in the central area of the country where natural gas, refinery gas, coke-oven gas and blast-furnace gas would be converted into ordinary town's gas, this gas being then transported to the areas needing it. The proposed company would control all gas supplies at the national level. This is a particularly original form of integration.

International Market ?

In considering new possibilities geographically speaking, the regional aspect is at present predominant, perhaps to some extent because the industry has only recently developed. There seem, however, to be the beginnings of a change in some countries, especially in Austria and France, while in the U.S.S.R. the richness of the deposits and the remoteness of the large consumption centres are in process of causing the natural gas industry to burst its regional bounds. Even now it is possible to foresee a time when natural gas consumption will overflow both the regional and the national limits and make its appearance on the international market. The transport of liquefied natural gas, which is under consideration in the United States and the U.S.S.R., may perhaps further expand markets in the future. It is certainly difficult at present to make any pronouncement on the real prospects in this field. In many countries the possibility of importing natural gas in tankers has aroused keen interest for some years. This solution, if it were definitely found to be technically and economically feasible, would obviously afford most substantial advantages to the gas industry. In conjunction with the use of liquefied gas storage facilities such as exist in the U.S.S.R., it would make it possible to meet peak demand and thereby to obtain extremely favourable network utilisation coefficients, at least in the areas close to the ports.

The natural gas industry, now in full development, enters in many ways into the existing patterns of energy supply. At the economic level, its relationship to the petroleum industry and its suitability for chemical uses orient it towards direct sales to consumers and, in many countries, towards a prior emphasis on profitability, which bring it close to ordinary industries. However, its status as a national resource and its dependence on pipeline systems inevitably draw it towards the public distribution services. In many cases the present organisation represents an effort towards the combination of these two concepts, a combination which, while it has perhaps not been fully achieved in all cases owing to the relative newness of the industry, seems to be in the line of its development.

There is no hiding the fact that the insertion of a new form of energy having such remarkable properties as natural gas into the existing patterns of energy supply raises delicate problems for which widely differing solutions may be found in different countries. The choices which have to be made may be influenced both by economic conditions and by legislative structure. So far as legislative structure is concerned, in countries with economies of the liberal type the public authorities can exert some influence on natural gas markets to the extent that the distribution of this gas is, owing to the fact that the distribution pipings are a feature of the public domain, governed by a public licensing system, but the industry retains a wide margin of autonomy. In a planned economy, and in a number of economies of intermediate type, it is the public authorities that will decide on the best employment of natural gas. In any case, however, the choice is restricted to three possibilities:

First, it is possible to pursue a low price policy, in which case the trend will be towards sales to industrial users and, more particularly, to the chemical industry, which is at one and the same time a large consumer and a stable demand consumer; this policy lowers costs, and the influence of natural gas on the energy economy and on the economy is general is very powerful and at the same time highly restricted. Second, natural gas may, in accordance with the rules governing public distribution, be distributed to all users who desire it; prices will then rise and the selection of uses will become a matter within the discretion of consumers. In this case the domestic sector and the small industries mainly interested in the flexibility of this form of energy will provide a heavy demand. Third, in planned economies, uses may be selected according to their social utility as determined by the economic plan. It is probable that in this case it will be the 'lofty' uses which will most often be given preference. The alternatives indicated are not so mutually exclusive as might be supposed. Actually, the solution in each particular case will always be a compromise, and it will be the more marked trends rather than rigid structures that will prevail.

While there is probably no criterion for an *a priori* choice of one method in preference to another, it is certain that an autonomous natural gas industry, in the present state of affairs, will choose the first, because it best suits its interests. It is not certain that this will always be the case, since with the introduction of measures to improve the coefficient of utilisation, such as underground storage, storage of gas in liquid form, interruptible contracts, and so forth, there may be a shift towards wider selectivity making it profitable to spread consumption over a wider field. The time factor is always the deciding one, and the natural gas industry will generally change as the years go by according to the available volumes and the extent of the network. The natural gas industry will then move towards the public distribution patterns traditional for manufactured gas. Direct sales may then cease to be the rule and be restricted to important individual cases where the influence of natural gas will remain decisive. It is possible, moreover, that this development will come less from a deliberate choice than from the relative importance of natural gas in the field of energy economy in general and of gas economy in particular. The greater that importance, the more will natural gas tend to assume the character of a public service by which all users will benefit.

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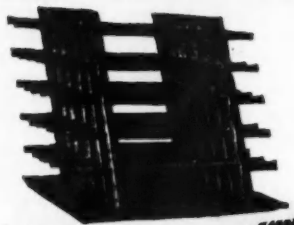

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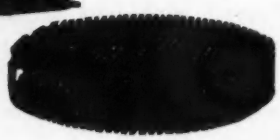

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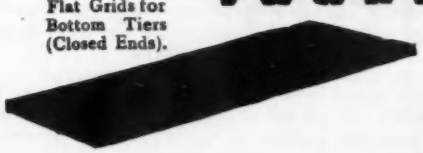

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(*Classified advertisements continued on page* 520)

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MINISTRY OF HOUSING AND LOCAL GOVERNMENT. The Civil Service Commissioners invite applications from men for about twelve pensionable posts: (a) six DISTRICT ALKALI INSPECTORS, (b) six ALKALI INSPECTORS under the ALKALI, etc., WORKS REGULATION ACT, 1906. Vacancies at Birmingham, Bristol, Cambridge, Cardiff, Leeds, Liverpool, London, Manchester, Newcastle-on-Tyne, Sheffield, Stoke-on-Trent. Considerable travelling: current regulations provide for first class rail or car mileage allowance plus subsistence allowance. Candidates must be prepared to serve in any centre. Duties include the administration of the Alkali, etc., Works Regulation Act, 1906, as extended from time to time by Orders, to control the emission to air of noxious fumes, smoke dust, etc., from certain industries, to ensure the proper design, lay-out and operation of plant for this purpose.

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TECHNICAL ASSISTANT (ENGINEERING), PONTYPOOL UNDERTAKING

APPLICATIONS are invited from suitably qualified persons for the position of TECHNICAL ASSISTANT (Engineering) to the Pontypool Undertaking.

The successful applicant will be required to prepare drawings and specifications for gasworks plant and to supervise erection and must have good Drawing Office experience. Possession of a Higher National Certificate in Engineering is essential and experience with Contractors would be an advantage.

The commencing salary will be within Grades APT. 8 or 9 (Provincial A) £745-£895 per annum of the National Salary Scale for Gas Staffs, placing according to experience and qualifications. The post is pensionable.

The successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with details of present and previous appointments and the names of two referees, should be received by the undersigned within fourteen days of the appearance of this advertisement.

A. FACER,
General Manager.

Gas Offices,
Hanbury Road,
Pontypool, Mon.

WALES GAS BOARD

APPOINTMENT OF DISTRIBUTION ENGINEER NEWPORT UNDERTAKING

APPLICATIONS are invited from suitably qualified persons for the above appointment for which the salary will be within Grades 11/12 APT. Provincial 'A' commencing at a figure commensurate with ability and experience.

Experience in Modern High/Low Pressure Gas Distribution Practice is essential including the planning and design of main laying schemes.

The person appointed will be responsible for the control of mains, services, fittings, cooker repair, and meter repair departments of the Undertaking. The Newport Undertaking is a rapidly expanding area with very considerable housing development and a large and increasing industrial load.

Applicants should be Members of the Institution of Gas Engineers or hold similar appropriate qualifications with wide experience in Gas Distribution Practice.

The post is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age, experience, professional qualifications, education and particulars of training together with the names of two referees, should be received by the undersigned not later than September 12, 1957.

A. H. DYER, M.Inst.Gas E.,
General Manager and Engineer.

Gas Offices,
Mill Street,
Newport, Mon.

A CHEMICAL ENGINEER is required to take charge of Research Department for the design development and commissioning of new chemical processes and plants allied to the Gas and Chemical Industries. Applicants should preferably hold a qualification in Chemical or Gas Engineering, together with several years practical experience. The position offers exceptional scope for initiative and responsibility, is permanent and pensionable, and the salary would be commensurate. Applications, which will be treated in the strictest confidence, should state age, qualifications, experience and an indication of salary scale, and be addressed to the Managing Director, Robert Dempster & Sons, Ltd., Rose Moor Iron Works, Elland, Yorkshire.

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SOUTH LANCASHIRE GROUP
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APPLICATIONS are invited for the above pensionable appointment at a salary within Grade A.P.T. 9 (£795/£895 p.a.).

Applicants should have a sound knowledge of modern distribution practice and should be Associate Members of the Institution of Gas Engineers or possess an equivalent qualification.

Detailed applications, giving the names of two referees, should reach the General Manager, South Lancashire Group, North Western Gas Board, Radiant House, Cotham Street, St. Helens, within fourteen days.

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The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be sent to Mr. S. Jones, Divisional General Manager, West Midlands Gas Board, Kensington House, Bath Street, Dudley, to reach him not later than September 18, 1957.

J. SWANN,
Secretary to the Board.

EAST MIDLANDS GAS BOARD

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Applications stating age and giving details of education, qualifications and experience, together with the names of two referees, should be addressed to reach the undersigned not later than September 14, 1957.

H. B. TAYLOR,
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Millstone Lane,
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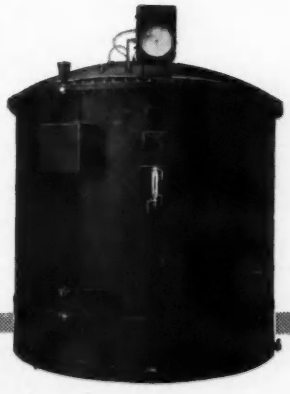

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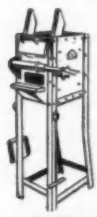

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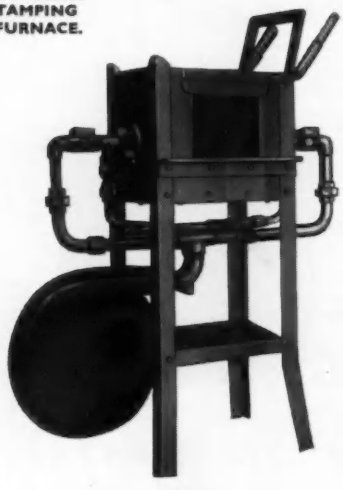

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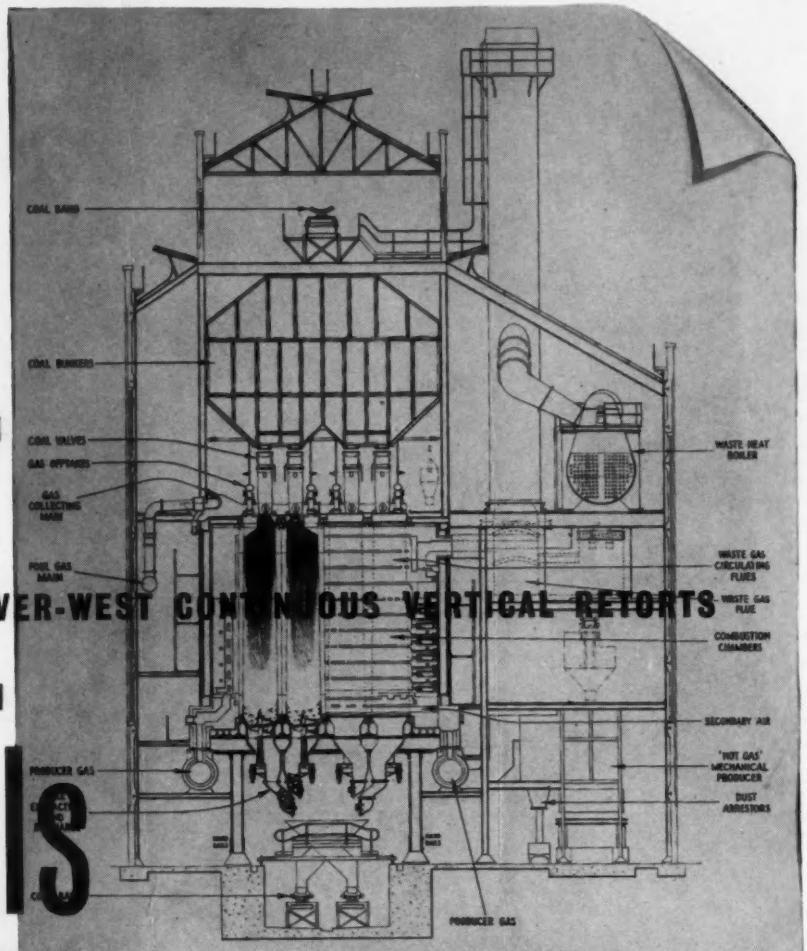

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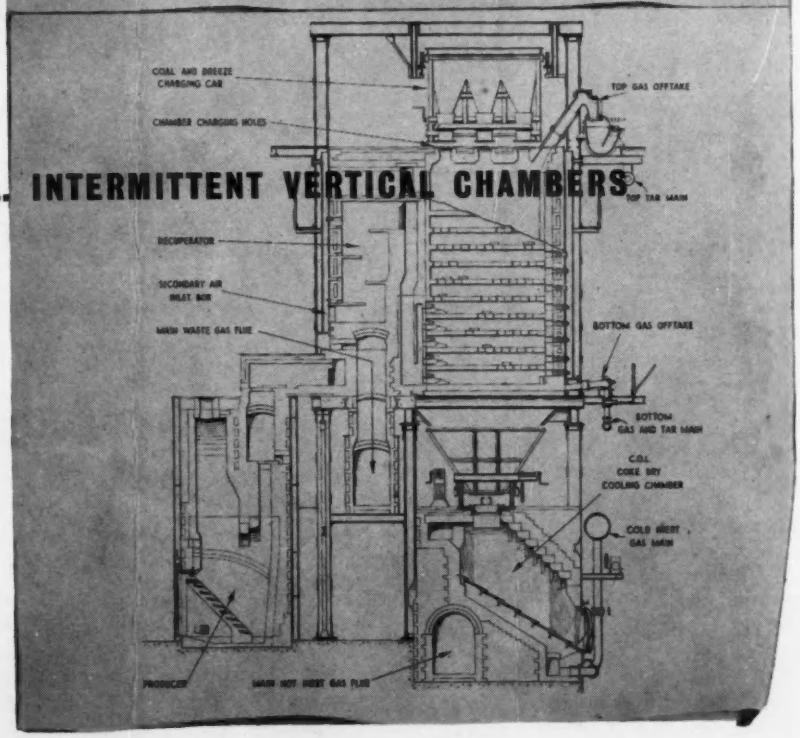

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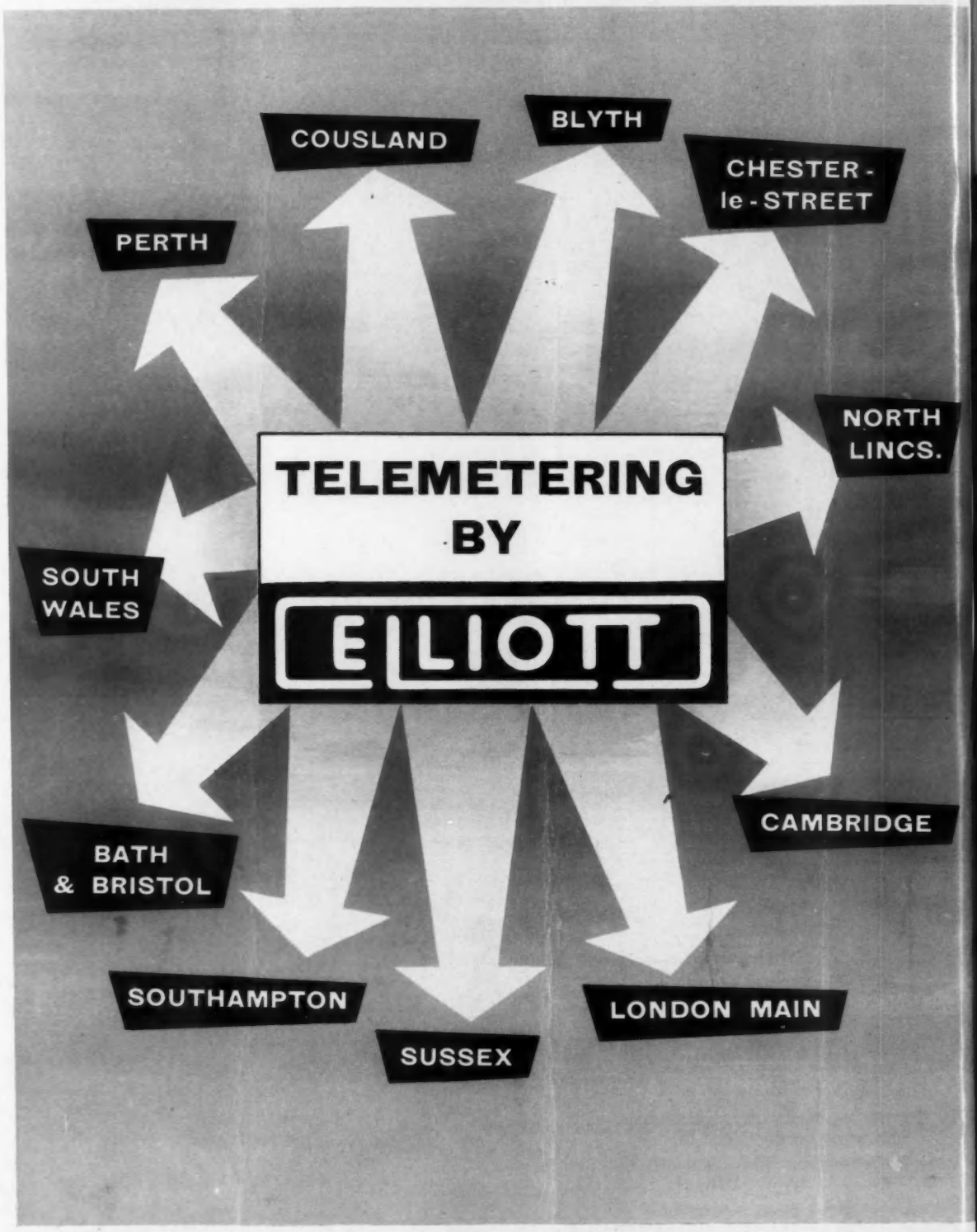

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